

A Preliminary Experimental Study of the Conscious Concomitants of Understanding

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INTRODUCTION

When a word or a phrase is presented to an observer for a certain interval of time, it will awaken a succession of various events in his mind, such as inner reading of the word, "sense of meaning," suggested images of objects or of other words, and so forth, attended by various feelings and emotions. In the succession of these experiences, some will precede, others succeed, and still others occur simultaneously with understanding. The purpose of the study about to be reported is to examine, by a special method of experimentation, first the relations of the events preceding and succeeding to understanding, and then to investigate the nature of the simultaneous events, *i. e.*, the consciousnesses of meaning.

The method of experimentation was the same as that used by Marbe,¹ Messer,² Bühler³ and others in their studies of thought, the so-called "*Ausfrage* experiment" by which

¹Marbe, K.: Experimentell-psychologische Untersuchungen über das Urteil, 1901.

²Messer, A.: Experimentell-psychologische Untersuchungen über das Denken, *Archiv für die gesamte Psychologie*, 1906, Vol. VIII.

³Bühler, K.: Ueber Gedanken, *Archiv für Ges. Psychol.*, Vol. IX.

the total introspection of observers in reaction to words or phrases is taken down in the form of protocols upon which the conclusions are based.

Remarks on the Method: In spite of certain objections against the method from the side of certain psychologists, as Wundt, who calls it a "pseudo experiment" (*Scheinexperiment*) because it satisfies none of the four requirements of a psychological experiment, viz.: concentration of attention, repetition of the experiment, methodical change of the conditions, and the observer's own determination of the phenomena to be observed,¹ yet the present writer had recourse to this method partly as a kind of trial, and partly because there are no other methods which seem better suited to the present purpose. The reasons for this belief are: (1) That this method leads to division of labor, in that the experimenter and the observer are different persons, and thus permits the observer to observe the mental phenomena more freely than in ordinary introspection in which the observer and the experimenter are one and the same person and so attention must be divided between two different tasks, one active and one passive, which fact itself is of great detriment to the efficacy of introspection, especially when it has to do with marginal conscious experiences, as is the case with the present study. Galton² in his early experiments on association was surprised to find so many associations connected with a single word, when he separated the active and the passive attitudes by a special device. (2) As a comparative study, it is freed from any individual peculiarities or prejudices of the investigator. And lastly, (3) as the totality of the introspection is set down, it permits the investigator to take a fairer view of the position and significance of any particular element in the totality of the mental reaction than would be possible in any other way. This last characteristic brings this study into connection at some points with the three important studies of the present time, viz.: the study of mental types, the study of thought-processes, and the study of associations. The study of individual types deals principally with the individual differences of the means to understanding. The study of thought-processes deals with the direct conscious concomitants of understanding. And the study of association deals with the suggested conscious experiences after the understanding. Each of these studies considers only one section of the conscious concomitants independent of the others, all of which can be found in the preceding, simultaneous and succeeding concomitants of understanding.

THE TECHNIQUE OF THE EXPERIMENTS

Three series of experiments were made in succession for the same purpose and mainly under the same conditions, except for differences in observers and apparatus and in some added elements in the third experiment.

Stimuli. The stimuli were words and phrases familiar and unfamiliar (or easy and difficult), concrete and abstract, mostly English or foreign. For abstract phrases proverbs were mostly used. For example: (familiar concrete words), snake, hand, mountain, etc.; (familiar abstract words) philosophy, psychology, fatigue, etc.; (unfamiliar concrete words) timbrel,

¹*Psychologische Studien*, Vol. III, No. 4, Sept., 1907.

²F. Galton: *Inquiry into Human Faculty and its Development*. London, 1883, chapter on "Psychometry."

nostrum, nabob, etc.; (unfamiliar abstract words) pistology, oneirology, noumenon, etc.; (familiar concrete phrases) The sea is calm; The milk smells sour, etc.; (familiar abstract phrases) Union makes strength; Duty before pleasure, etc.; (unfamiliar concrete phrases) Long tongue, short hand; One man is no man, etc.; (unfamiliar abstract phrases) A sin concealed is half pardoned; Time enough is little enough, etc. A new kind of stimulus (meaningless visual stimulus), in the form of Chinese characters, was added to the verbal stimuli in the third experiment. The account and description of these will be given later (Part III, § 3).

Forms of Reaction. Two forms of reaction, an active (or short) and a passive (or prolonged) were used. In the active reaction the observer was asked to react by saying "yes" in the first experiment, and by pressing an electric key in the second and third experiments, as soon as he understood the word or phrase, and immediately afterward to report in the order of its occurrence the whole process (or as much as he could recall), which took place in the interval between the sensory perception of the stimulus and the reaction. In case he did not understand the stimulus the observer was asked to give in the same way his introspection as to what occurred in the interval between the perception of the stimulus and a signal which was given by the experimenter after the lapse of five seconds from the presentation of the stimulus. In the passive reaction, the observer was asked to remain passive without reacting, but to let the processes go as they would until a signal for ceasing (which was given by the experimenter this time at the end of three seconds) and then to give his total introspection for the interval as before.

Presentation of the Stimulus. Two ways of presentation were used: an auditory, in which it was spoken by the experimenter, and a visual, in which it was exposed.

Apparatus. The apparatus for the exposure of the stimulus and the measurement of the time in the first experiment was simply a set of cards with typewritten words and phrases and a stopwatch reading to one-fifth of a second. In the second and third experiments this simple apparatus was replaced by a more elaborate one constructed for the purpose. It consisted of three principal parts, *i. e.*, (1), an exposer; (2), a registering apparatus, and (3), a control pendulum. The exposer consists of a large board with an opening about in the centre, behind which stimulus-cards were exposed in turn by means of the rotation of a large wheel attached behind the board. Between the stimulus-card and the opening there was a sort of fan which closed the latter until it (the fan) was raised.

The fan was attached to one end of an electro-magnetic lever and was raised and lowered under the following conditions: (1), in case of the passive reaction, it was moved automatically by means of the control pendulum which made and broke the circuit to the lever, the circuit being kept closed, and at the same time exposed the card for an interval of three seconds; (2), in case of the active reaction, the experimenter moved

the fan by a make-key; and (3), in case the observer did not react, owing to the difficulty of understanding, the experimenter lowered the fan at the end of five seconds. Two mercury contacts at the free end of the lever made, and the reaction key of the observer broke, another circuit passing through an electro-magnetic marker which traced the reaction curves on the smoked surface of the drum of a Zimmermann kymograph. The marker of a Jacquet chronograph cut time units on the curve which could be read by one-tenth of a second. Between the fan and the opening there were two shutters or slides meeting at the middle of the opening when both were closed, and exposing one-half of the whole surface, when one was opened, which was done for words. With phrases both slides were opened. Special care was taken for the prevention of all distracting noises. In its rotation the apparatus made but very slight noise which was almost totally shut off from the observer by the large board of the exposer. The most comfortable position of the observer was obtained by the adjustable inclinations of the board and the height of the chair.

Observers. Of the 14 observers, 3 were Japanese students reading and speaking English fairly well, all others were English speaking people. The distribution of the observers and their qualifications were as follows:

Experiment I.

An.	Outsider.
Cff.	Student of psychology.
Gl.	Student of psychology.
Hi. (Jap.)	Outsider.
Kk. (Jap.)	Student of psychology.
Kn. (Jap.)	Student of psychology.

Experiment II.

Ac.	Student of psychology.
Ky.	Student of psychology.
Sm.	Student of psychology.
St.	Student of psychology.

Experiment III.

Ac.	Student of psychology.
Ch.	Student of psychology.
E. M.	Student of psychology.
L. M.	Student of psychology.
Sn.	Professor of psychology.

Remark: Several auxiliary experiments and minor tests with some of these observers and several others were made for special points. The description of these experiments has been omitted owing to the limits of space, and references only will be made to them.

Samples of the Protocols. The following are a few samples of protocols from among nearly five hundred thus obtained. They represent about the average length or amount of the reports, some being shorter and simpler, while others are longer and more minute. They are the reactions of three

observers, one from each experiment, to familiar abstract words, (A) by the active form of reaction, and (B), by the passive form. The stimulus-words for observer Cff., in the first experiment, were spoken, while those for others were exposed. Even by reading these few, which are typical in many respects, the reader may find traces of the general influence of these conditions upon certain of the concomitants.

A. ACTIVE REACTIONS

Fault. (I exp. word spoken; Obs. Cff. No. w. 20, time, 1.5"). "While you were saying the first half of the word I wondered what you were saying. Then the sound lingered. And I got the consonant at the end, and the meaning at the same time. No image, but just feeling of meaning. There was a feeling of satisfaction and at the same time dissatisfaction. It is hard to analyse."

Peace. (II exp. word exposed; Obs. Ac. No. iii-5, time, 0.5"). "Expectant attention keyed up owing to the delay of the arrival of the stimulus word. I read it in inner speech and grasped the word and relaxed. I grasped it at once in a very vague way, but at the same time with a feeling of assurance that I was right although I had very little of any imagery."

Psychology. (III exp. word exposed; Obs. Ch. No. iii-15, time, 0.5"). "First feeling (of recognition of the form of the word) was followed instantly by the feeling of familiarity. There was no imagery. In this particular case it appears that the feeling of recognition and the feeling of familiarity are the same thing. There was n't any imagery, any attempt to define the word. I recognized the word. Absolute certainty."

B. PASSIVE REACTIONS

Philosophy. (I exp. word spoken; Obs. Coff. no. w. 11.) "I got the apperception of the word at once. It came in connection with a recent little discussion with a fellow student on some question on philosophy. It occurred just this morning. I had just the sound of his name, very vague, and hardly any visual image of the place where we had discussed. Then I began to pronounce the name of 'Weber'. Also the word 'examination' was present. But no definite visual image of anything."

(Remark: The date of the experiment was shortly before the observer's doctor's examination and he was then reading Weber's History of Philosophy.)

Apperception. (II exp. word exposed; Obs. Ac. No. w. 36.) "Read it in the same way as before. I at once thought of Dr. Sanford in the lecture room giving the definition of the word. I had a vague visual image of him and the room."

Apperception. (III exp. No. iii-1, 16, word exposed; Obs. Ch.) "Pronounced the word. There was no feeling of effort, but just feeling of familiarity which came at once. I did n't put the meaning in words, but had simply a feeling of what it meant. Then I got a peculiar visual image of myself taking notes of the lectures in the classroom. The name 'Wundt' came into my mind in auditory form. The feeling was rather neutral."

On the Working up of the Protocols. These protocols were read with the following two points in view: First, the influence of the conditions upon the frequency of the concomitants. The conditions were divided into, *a*, material (*i. e.*, concreteness-abstractness of stimuli, etc.) *b*, experimental (whether the stimuli were exposed or spoken, etc.); *c*, individual (wheth-

er the observer belonged to the visual or auditory type, etc.). The primary or vital influences were taken chiefly into consideration though sometimes secondary influences were also considered. The second point was to examine the relative positions of the concomitants with reference to the understanding and to each other in the temporal sequence of their occurrence.

PART I

CONDITIONS OF THE PRECEDING CONCOMITANTS

These concomitants were reproductions of the sensory components of the stimulus word or phrase, *i. e.*, audito-motor reading and visual imagery of the stimulus. In ordinary introspection these events are often overlooked by many, as we are accustomed to attend only to the meaning and not to the means by which we reach it. According to their kind and frequency they have been sometimes used as criteria for individual differences. Sometimes they have been identified with meaning itself. In our experiments they were first to occur, following directly after the sense perception of the stimulus, excepting some cases with the visual reproductions which frequently followed, or occurred simultaneously with, the understanding. With easy or familiar stimuli the understanding followed immediately without any intermediary imagery. With unfamiliar or difficult stimuli there occurred often intermediary imagery such as the appearance of other verbal images in the form of synonymes, translations, definitions, etc., or suggested object images. As these were in their nature exactly identical with suggested images or those occurring after the understanding with easy stimuli we shall consider them later in Part II.

§ 1. AUDITO-MOTOR REPRODUCTION OF THE STIMULUS

Influence upon the frequency of audito-motor reproduction of the stimulus (i. e., the reading of the word in inner speech) when (a) the stimulus was exposed and (b) when it was spoken.

The influence of these conditions was so marked and definite that the results of the three successive experiments showed the same tendency and the influence of other conditions was almost negligible.

The total number of cases of this form of imagery in ten observers was 291 out of 311¹ or 93% when the stimuli were

¹ From this total, the first one or two (tentative) reactions by most observers are excluded. Also the reactions of four observers *An. Kk. Sm. St.* are excluded, for the reason that in case of the first two, the stimulus was spoken only. In the case of *Sm.* the tendency was not clear in the earlier reactions, with *St.* it was not clear in any of the reactions; about these see the succeeding accounts.

exposed; while it occurred in only 17 out of 176¹ cases, or 9%, when the stimuli were spoken. And these 17 cases occurred mostly when the stimuli were rather difficult or the pronunciation by the experimenter were indistinct.

We may conclude, therefore, that the inner reading of the word generally occurs when it is exposed, and occurs seldom when the stimulus is easy and spoken. In other words, the appearance and non-appearance of the reading of the stimulus in inner speech is primarily conditioned by the way of presenting the stimulus.

For the determination of the secondary influences affecting the frequency of this imagery, *i. e.*, influences arising from individual differences and from qualities of the material, some minor tests were made. The first thing to be mentioned is the fact that at the start the majority of our observers did not know about this tendency, but became aware of it after a few reactions, owing, perhaps, to the summation of the faint impressions occurring repeatedly at the same place, *i. e.*, at the beginning, in each reaction. One observer (*Hi*) belonging to a very pronounced motor speech type was not aware of this tendency at first, but a simple test of reading with the mouth open, etc., brought his attention, to his great surprise, to what he was actually doing. A lady (extra observer) who when asked about this tendency denied it, or was at least doubtful about it, was also surprised to find it after a simple test, and confessed that in her whole life she was never aware of it before. With another extra observer (*Ms*), to whom the presence of this tendency was doubtful, a test with simultaneous counting or speaking of a word showed that he could not read understandingly while they were continued. With two observers (*Sm*, *St*) who said they read by eye, the results of a test in the instantaneous grasping of a list of unconnected words or phrases showed no differences from other observers, either in the amounts of reproduction or in the ways of reading, *i. e.*, instead of grasping the whole at once at a glance they also read the words one by one in the same way as others. One of them (*Sm*), who denied the presence of this tendency in the reading of some phrases, found it later almost always with words. There was thus only one observer remaining who did not yet find in himself this tendency. No further tests with him have yet been made, so I cannot absolutely decide at present whether this process is really lacking in him or he is only

¹ This smaller number of spoken stimuli is due to the fact that in the majority of the second and the whole of third experiment the stimulus was only exposed.

not yet aware of what he actually does, but from the results of the test above stated and from the reports of many about the difficulty of the introspection of this tendency, the most probable supposition is that he is subject to it in spite of himself.

The distinction between the auditory and motor elements in inner reading our observers found it hard to make. But if we call the inner reading with the consciousness of the innervation or movements of the organs of speech motor, and the inner reading without these auditory, then there was at least one observer (*Hi*) who belonged to a pronounced motor type, like that of Stricker. With difficult words or phrases most of our observers went over to the motor speech form, and inner reading became pronounced. With familiar words of many syllables or with familiar phrases, mutilated reading was not uncommon. In the repeated reading, in inner speech, of unfamiliar and difficult phrases (mostly proverbs), reading with emphasis upon the principal words, or first a quick reading of the whole followed by a return to the principal words, was also frequent.

The conclusions suggested by these studies are: (1) that motor reading in the sense above defined is not universal as was believed by Stricker¹ and assumed by Max Müller,² but is limited to some individuals only, and with average individuals, to the reading of difficult words. (2) Auditory reading in the above sense, on the contrary, seems universal and necessary for the understanding of exposed words or phrases, which favors the view that the connection between the auditory and "concept centres" is immediate, while that for the other senses, *i. e.*, motor and visual, is indirect.³ (3) Expressed in terms of conditions, the occurrence of auditory reading is mainly conditioned by the method of experimentation (*i. e.*, exposure), while that of motor reading is influenced by (1), the method,⁴ (2) the material, and (3), individual differences.

¹ Stricker: Ueber die Sprachvorstellungen. Wien, 1880. One of his tests is: "Keeping the mouth open and the tongue firm try to think the words papa, morning, stammer, etc.; If you do not succeed it means that a motor image is necessary to your inner speech."

² Max Müller: Lectures on the Science of Thought. 1887 (1st ed. 1883), Chicago. In his letter to Galton he unconsciously betrays his type in these words: "Yet if we watch ourselves, it is very curious that we can often feel the vocal chords and the muscles of the mouth moving as if we were speaking." *Ibid.*, Appendix, p. 8.

³ Cf. Dodge: Die motorische Wortvorstellungen. Wien, 1896, p. 62.

⁴ The writer thinks it very likely that even persons of pronounced motor type would not experience innervation or movements of speech-organs in the case of *hearing* easy or familiar words.

§2. VISUAL REPRODUCTION OF THE STIMULUS

Influence upon the frequency of visual reproduction of the stimulus when (a) it was exposed and when (b) it was spoken.

There occurred 30 cases of visual imagery of the stimulus out of 81 reactions with 3 observers (*Gl, Hi, Kn*) when the stimuli were spoken, and not a single case occurred in 61 reactions, with the same observers, when the stimuli were exposed. With two other observers (*Ac, Cf*) no case occurred—neither when the stimuli were exposed (71 reactions) nor when they were spoken (65 reactions). With the rest of the observers none occurred in 179 reactions to the stimuli which were exposed.

Of the three observers with whom this form occurred, two were Japanese. This naturally led to the suspicion that the frequency of this imagery for them might perhaps be the result of unfamiliarity with the English language, and not to individual peculiarity. This suspicion was, however, soon dispelled by an extra test with a number of Japanese words as stimuli which showed the same results; the only difference being that with Japanese words orally presented, the visual image of the stimulus was directly followed by understanding or suggested images, while with English words, the visual image of the stimulus was sometimes succeeded by the image of the corresponding Japanese word before the arrival of understanding or suggested images.

For instance: '*Traveller*'—(Obs. *Hi.*). "First I heard distinctly the sound 'travel'. There was a moment of hesitation and doubt. Then I saw the printed image of the word 'traveller' accompanied by the images of the Chinese characters, and at the same time full realization of the meaning. Then I saw mentally a traveller walking on Main Street."

The form and localization of the image were almost constant in the same individual. All three localized the image, usually at a distance of one or two feet in front. Two observers saw the image in handwritten form, the other in printed form.

About the frequency and conditions of suggested (associated) verbal imagery we shall see later.

These results lead to the conclusion: (1) that the visual image of the stimulus word occurs only occasionally when the stimulus is spoken, and scarcely occurs at all when it is exposed. (2) There are great individual differences in this experience as in the case of motor speech; in other words, this imagery is especially conditioned by the method of experimentation and individual differences.

The results of the above study in so far as they bear upon the validity of the customary method for the determination of individual types are, in certain respects, negative,

viz.: (1) We cannot wholly rely upon the questionnaire method in the study of types, because there are many people who are not aware of what they are actually doing. (2) Because the frequency of these speech forms primarily depends upon the manner of the presentations of the words, we cannot at once label an individual as, for instance, of the auditory or the motor type simply because he says that he pronounces when he reads or when he writes, etc.¹

PART II

CONDITIONS OF THE SUCCEEDING CONCOMITANTS

When the stimuli were easy and familiar, the images of other words than the stimuli and the images of objects or events suggested by the stimuli, or, in short, what I might call "suggested images"² usually followed the understanding. When the stimuli were difficult or unfamiliar, they frequently preceded the understanding, but followed the images of the stimulus words or phrases. These cases of preceding suggested images I will call "intermediary images." All these images, the preceding, intermediary and succeeding suggested images, were of the same kinds differing only in their temporal relations to understanding.

All the suggested images which we need consider may be divided into two main classes, according to the nature of their constituents: (1) object images, which are the representations of, or references to, concrete objects or events; and (2) verbal images, which are the visual or audito-motor representations of suggested or associated words.

I shall begin with the succeeding suggested images or images following the understanding of familiar stimuli, and first with one of the object images, namely with memory images.

¹ These considerations seem to be neglected by the following authors Patini, E.: *Contributo allo studio sperimentale della formula endophasia*. Napoli, 1907. Cf. p. 26, observation xlv, and others. Ribot, T. *L'évolution des idées générales*. Paris, 1897. — Cf. Eng. tr. 1899, p. 114 ff. Max Müller. *op. cit.* Appendix p. 26. There in his answer to Romanes he wants to prove the universality, among all individuals as well as under all circumstances, of motor speech in thinking, by referring to special cases, and says: "How could I hold pronunciation necessary for thought when I am silent while I am reading, while I am writing?" When one listens, it is not necessary for understanding to pronounce each word.

² The term "image" is used here in the broadest sense including faint and indefinite experiences if they refer to concrete objects or events which can be in other cases distinctly represented. For instance, such experiences as, "I thought of that typewriter," or, "I thought of my buying a typewriter at a store about a year ago," etc., were also included as images though it is by no means clear in these cases what kinds of sensory imagery, (*i. e.*, visual, auditory, kinesthetic, etc.), were actually present. For further analysis of these experiences see Part III.

Experimental conditions. The numerical results given in the following discussion are from the records of reactions to familiar stimulus words (not phrases)¹ by the ten observers who assisted in the first and second experiments. Results from the third experiment, which confirmed those of the preceding ones, are sometimes referred to. The frequency ratios of various sorts of imagery are regarded merely as representing general tendencies or main proportions and not at all as expressing exact or even approximate relations. The total number of reactions to easy words² in the first and second experiments under the different conditions, whose influences we are about to examine, was 285.

§1. MEMORY IMAGES

By memory images here are understood those which refer to particular personal experiences with the objects or events indicated by the stimulus. They can always be localized in space (where) and time (when). They are sometimes called reminiscent associations.

Results of the Experiments. 1. This imagery not only followed the understanding, but also made the terminus of the reactions in which it was found, *i. e.*, other suggested images when they occurred generally preceded, and seldom succeeded, the memory imagery in the allotted intervals of the time, owing, perhaps, to the richness of contents or the vividness of the latter.

For instance: *Wheel* (passive, spoken stimulus, Obs. Gl. No. w. 22). "First thought of all kinds of wheels, blurred and indistinct images of multitude of wheels. Then the one I saw recently emerged very clearly in mental picture."

Vacation. (Passive, word exposed, Obs. Ac. No. w. 5.) "I read and spelt the word twice mentally. I thought of week-after-next and the work that I planned to do then. I think I thought of that because I have been recently thinking about the work to be done. And then I recalled the conversation I had in the Bloomingdale hospital a few minutes ago. Dr. C. proposed to meet his class next week. Some one said we had vacation then and Dr. C. had trouble to understand on account of his ear trouble."

¹ The results with phrases were not calculated for the following reasons: (1), The number of words used as stimuli, was greater than that of phrases; (2), there were no new kinds of suggested images found in phrase-reactions, those in the word-reactions and phrase-reactions being practically the same (Ribot found the same results; *Cf. op. 114 ff.*) the only definite difference being that with phrases the suggestions were more definite a matter which we shall consider later; (3), furthermore with phrases, not only the suggested images were less in number and more limited in variety but very frequently there occurred none at all, perhaps because the reactions took more time and energy than those with words.

² Ease and difficulty are only relative distinctions, some of the easy stimuli turned out to be rather difficult or unfamiliar ones to some observers. *Cf.* the remark under § 6 (Difficult stimuli).

The scene of the classroom was pretty vivid, and it was rather interesting, amusing."

2. This imagery in the case of passive reactions occurred in more than two-fifths of all the reactions of all the observers, the figures being 102 cases out of 242 passive reactions to easy words for ten observers with no considerable individual variations among them. The active reactions with easy words (not phrases) in the first experiment were in all but 37, made by three observers (*An*, *Gl*, *Kn*). In these 37 there were four cases of the sort of imagery now under consideration, all in the 15 reactions of observer *An* alone. The results of the third experiment, in which the majority was of active reactions, showed also very definitely that a memory image seldom occurs in active reactions. In all the cases in which it occurred, the observers reported it as occurring after the reactions or at any rate after the understanding.

3. Abstractness in the stimulus words had little or no influence on the frequency of this imagery in passive reactions to easy stimuli, or, if any, tended more toward inducing recent memory images than did the concrete words. Of 50 cases of recent memory images¹ out of 151 reactions in the case of five observers (*Ac*, *Gl*, *Hr*, *Kn*, *Ky*) 30 cases occurred with 74 abstract words and 20 with 77 concrete words with no considerable individual variations. The same general tendency is shown in the results with the rest of the observers. Likewise, whether the stimuli were spoken or exposed made no noticeable difference with the frequency of imagery of this sort.

4. Beside the passivity of reaction, the most important factor for the occurrence of this imagery was the recency of association. (a) Out of 106 memory associations in 285 total reactions 82 were recent associations or reminiscence of events falling within a period of not more than one or two years previous, 21 of remote associations, and only 3 of boyhood associations.² (b) Quite insignificant and accidental associations, alone, without any emotional excitation or logical connection or repetition, by sheer power of recency, occurred frequently, pushing other images aside.

¹ These were the most frequent of all memory images; for details, see the sections to follow.

² These results rather contradict those found by Galton. The numbers which he found were: boyhood associations 48, manhood 57, while "quite recent events" had only 19, in his four times repeated experiment with 75 words. These are, of course, the combined results of the pure revivability and the fixity or tenacity of associations as they were repeated. But even in his series of the first reactions the frequency of recent associations is quite low. Cf. *ibid.*, p. 195.

For instance: *Ink* (Obs. *Ky*), "Pronounced the word. Idea of the blackness was the first thing. Then I thought of those ink-blotter I got this morning at a down-town store. There was a vague image of blotters. I had also clear image of my fingers being dabbled with ink which occurred a couple of days ago."

Vacation. (Obs. *Sn.*) "I think I saw the middle of the word and noticed the syllable 'cat'. Then I read the whole word to myself. I think I had an incipient pronunciation of it in inner speech. Then I remembered that this word was the word which Dr. Bolton read when we came here yesterday. I didn't get any definite image except that association. I just thought of it, an idea of direction rather than a visualization. That idea of direction is very frequent with me as the first thing to come in case of such an association as that."

(c) With such words as *vacation*, *memory*, *fatigue*, *pedagogy*, *philosophy*, *apperception*, etc., which were purposely selected and used in the third experiment (mixed among other words), the observers had in nearly all reactions, in spite of the abstractness of the words, a concrete image in the form of a recent memory association which the experimenter could often predict from his own share in the same recent and repeated experiences, e. g., the images of certain professors, the classrooms, certain authors, etc.

For instance, *Apperception* (Obs. *E. M.*). "First slight tension and action on the motor side with the pronunciation of the word. Then the meaning came, but there was an effort to get the psychological meaning. I had a rather clear visual image of pages in Wundt's 'Outline of Psychology' in which the thing is treated. And then the visual image of Dr. S. in the lecture room and also some auditory image of his voice."

Pedagogy. (Obs. *Sn.*) "I was not quite ready. I read the word in inner speech but not very loud, and was not quite sure whether I read it correctly. So I read it again and I had a faint feeling that I knew the word. Then I thought of the direction of Dr. B's room and probably had also a very vague suggestion of Dr. B. himself. The consciousness of direction was very clear. I had the word 'teaching,' probably in inner speech."

Remark. Ribot's "thinking by analogy" by which he means such reactions as "I thought of Hume's theory of causality", for the stimulus "*cause*"; or the recalling of "Littré's definition" for the word "*Justice*", and so forth (*ib.*, 114 ff.), is merely our "memory imagery," and cannot therefore be regarded as a special mark of individual differences. The whole matter rests upon the duration (slowness or quickness) of reactions. Besides, with these familiar words, and especially in scholars, the understanding of what the words mean precedes any suggested images, so that such memory images are not means to understanding but the results of natural and spontaneous associations.

§ 2. INDICATIVE IMAGES.

For the lack of a better name, I have called "indicative images" those which referred to particular objects found in the

room at the time of the experiment. For instance: *Typewriter*, I thought of that typewriter on the table. *Experiment*,—I thought of this experiment, etc. In their psychological nature, a strict line of demarcation between this sort of imagery and recent memory imagery is hard to draw as the one gradually passes into the other; yet I found a separation, by the conventional definition above given, necessary in the treatment of the results for, in the first place, the frequency of indicative imagery was markedly more pronounced under certain conditions than that of memory imagery; and in the second place, it seemed to be influenced by a new factor soon to be mentioned. So that, when, for example, the word *Entrance* suggested to some observers the aperture of the experimenting apparatus, and to others the door of the experimenting room, while to a third the gateway of the university or that of the library, and to a fourth the entrance to the court house of this city, and to a fifth the entrance to the capitol in Washington and finally to a sixth some front steps leading up to a building, I put the first two into the category of the indicative imagery, the third and the fourth into the recent, the fifth into the remote memory imagery and the sixth into the general visual object imagery described later on.

Sometimes one and the same response, therefore, may become the one or the other of these types of imagery according to circumstances. For instance, with the word *Seminary*, if one thinks of Dr. H—'s seminary, or Dr. S—'s or Dr. B—'s, it will be a case of indicative imagery when the word was given there, while it will be recent memory imagery when the experiment was performed at some other place, and remote memory imagery when it was made years after the personal experiences of the observers.

But a very small number of appropriate stimulus words for the arousal of imagery of this sort, such as *room*, *window*, *entrance*, *watch*, *hand*, *typewriter*, *experiment*, etc., happened to be found in our list of stimulus words. Nevertheless the following tendencies were rather definitely brought out. 1. The occurrence of imagery of this sort is primarily conditioned by a special kind of stimulus words which I may call "indicative words," such as those just mentioned. 2. With these words this imagery occurred in far greater number of cases when the words were spoken than when they were exposed, the frequency ratios being respectively 89% and 19%. Further inferences with reference to this sort of imagery are impossible from the data at hand, but the following one is also suggested by the results, namely that this sort of imagery is determined by a new factor which I might call "implicit context"; in other words, the spoken stimulus word becomes

virtually in its effect a phrase especially adapted to induce imagery of this kind. In daily life we are accustomed to react to a single word under such circumstance when the object indicated by the word is near at hand and the speaker wants something to be done with the object. A single uttered word then is, in fact, an imperative sentence, meaning, for instance, 'Please give me that thing', or 'Look at it', etc., and the person addressed turns his attention instinctively to the object mentioned. Now in the experiment when an "indicative word" is uttered the observer falls unconsciously into this attitude, because of the similarity of situation; while, when it is exposed, this link of habitual associations becomes broken, whence the less frequency of this sort of imagery.

In the temporal order of occurrence, this imagery was, in general, the promptest of all suggested images, occurring immediately after, or sometimes simultaneously with, the understanding.

Remark. In this kind of reactions, which were, as a rule, rather reflex, the full realization of the meaning, such as richness of concept, came often later than the arrival of this imagery, though the understanding of the word in the sense of recognition obviously preceded it. To these varieties of meaning we shall return in Part III.

§ 3. ORGANIC IMAGES

Under this term I understand a reference to, or becoming aware of, the organic sensations or feelings either produced directly or revived, which are habitually associated with the words. The term organic sensations is used here in its broadest sense, comprising kinesthesia or sensations of muscular movements or innervation, as well as sensations attending the conditions of internal organs.

For instance: *Excitation:* (*Ac*) "Read it in the same way. I tried to state it in the sense given by Wundt. Then I tried to think about the psychological evidences of excitation, and simulated to myself its bodily state unconsciously." *Rain.* (*Ky*) "First pronounced the word inwardly. Next there was a visual image of raining just outside of this window (of the experimenting room). There was also an idea of wetness just in the form of bodily sensation in which no visual or auditory elements were discernible."

Results. 1. This imagery occurred in a very small number of cases. 2. It occurred only, (a) with a special class of stimulus words suggestive of this imagery or what I might call "Organic words", with which the organic associations (or components) more or less predominate, such as, *respiration*, *suffocation*, *fatigue*, *uneasiness*, etc., and (b) with passive (or prolonged) reactions. 3. It seldom occurred alone but

usually accompanied by other suggested images, such as verbal and visual imagery. In cases of its concurrence with these images it usually succeeded the latter, *i. e.*, it was less prompt in its occurrence than visual and verbal suggested images.

§4. GENERAL VISUAL-OBJECT IMAGES

These images, instead of referring to any particular object or event of past experiences like memory images, represent, predominantly in visual terms, merely types or concrete examples of objects designated by the stimulus words. For instance, *Box*—I had a visual image of a wooden box. This is a case of simple object imagery in which only a single object is represented. It occurred often that many objects belonging to the same class were visualized simultaneously or in quick successions, producing what I may call "complex object imagery." In such cases the visualizations were, as a rule, faint and incomplete. For instance, *Animal (An)*—I thought of all sorts of animals moving alive, etc. *Vacation (L. M.)*—(I had a very rapid visual impression of landscapes. The ideas or faint visual images of a whole summer.

Sometimes these general visual images, which as a rule preceded memory images, turned out to be the first stage of the latter, in the same way as free associations are sometimes traced to particular incidents. For instance, *Cross, (Ac)*—When I heard the word, there came at once the picture of a crucifix. It seemed to be traced to those pictures of crucifixes which Dr. H— showed us in his lecture on Christ. It impressed me at that time.

Results. 1. There were great individual differences in the frequency of this imagery, ranging from zero to 53%, in the percentages for the ten observers. 2. In the case of this imagery, reversing the case with memory imagery, the concreteness and abstractness of the stimulus word influenced the frequency of the imagery in a marked degree, the frequency with concrete words being nearly three times as great as that with abstract words. 3. The frequency of imagery in all the reactions was 51 cases in a total of 286, falling thus far below that of the memory imagery, but rising far above that of the organic imagery. 4. In cases of concurrence this imagery always preceded memory imagery.

§5. SUGGESTED VERBAL IMAGES

By a "suggested verbal image" is meant here a visual or audito-motor reproduction of a word associated with the stimulus-word. It must be distinguished, therefore, from the verbal imagery of the stimulus word itself the conditions of which were treated at the beginning of this paper. Suggested

verbal imagery may occur either with or without corresponding object imagery, *i. e.*, dependently or independently. All independent imagery which appeared in our records was in the nature of either sensory or conceptual associations (*i. e.*, those having a sensory or a conceptual relationship with the stimulus words). In sensory associations we found only "klang associations," or associations by the similarity of sound. In conceptual associations there were roughly three kinds: 1, synonyms, 2, contrasts, and 3, co-ordinations, subordination and superordination. For instance (co-ordination) dog—cat; (subordination) city—New York; (superordination) cat—animal.

Results: 1. There were very marked individual differences in the frequency of this sort of imagery, as in the case of general visual imagery, the ratio ranging from zero to 100%; for instance Obs. *Ac.* had no cases of this imagery in all his reactions, while Obs. *Sm* always had it. Some observers had a few cases, others many. 2. The frequency of this imagery like that of general visual imagery was also markedly influenced by the nature of the stimulus word (abstractness or concreteness) and in this case in inverse relation. It occurred three times as frequently with abstract words as with concrete words. 3. As to "klang associations" there were only three of them in all the reactions, and only in the case of one observer (*Sm*), so that this form must be regarded as rather exceptional, at least with easy stimulus words. (Of the frequency of this form with unfamiliar words we shall speak later.) We had now and then phrase reactions from four observers most of which appeared in the form of definitions of abstract scientific terms. Conceptual associations in the form of synonyms, etc., however, made the majority of the cases. 4. As to the time of occurrence: With independent imagery, it was one of the quickest to occur; in case of concurrence with other images, it generally preceded the general visual image and the memory image. With dependent verbal imagery, the time depended on that of object imagery which the verbal imagery accompanied.

On the Tracing of Verbal Imagery

With independent verbal images the observer in the majority of cases could not give introspectively any account of their origin owing to the lack of conscious background.

For instance, *Excitation:* (Obs. *Sm*) "Pronounced. The word *psychology* came which was pronounced and visualized in typewritten form. Then I saw the German word *Erregung* printed in black. Then in inner speech I said 'I wonder why I selected these words.'"

This imagery though difficult to be traced subjectively is yet

easily traced objectively in the sense that it can be easily brought under conceptual or logical classifications. The dependent verbal imagery, on the contrary, is easy to trace subjectively and hard to trace objectively.

Suppose the observers reacted by uttering just the dependent verbal images in response to the stimulus words (without giving their total introspections) and then the experimenter or any outsider attempted to trace them objectively, as best as he could. Then compare the results obtained by conjecture with the actual connections found in the total introspections of the observers. Such a comparison is easily made by placing all such verbal imagery found in the protocols directly after the stimulus words. For instance, *Horse*, (Obs. Cf.) [suggested verbal images] "The name of a friend of the observer" and "horse."

Introspection: "The sound of your voice lingered. Then there was a sort of general idea. Then a rather pleasurable feeling due to the recognition of a favorite animal. There was a complex vague association there, such as a vague notion of a useful domestic animal. Then I had a visual image of being on horseback, with a sort of inner speech in auditory terms, going riding with a friend of mine who suggested it to me. I heard or pronounced his name and also the word 'horse' pretty distinctly. The localization of the scene of the riding was far down in the direction he (my friend) has suggested. The suggestion of his occurred but two days ago."

Turkey, (Obs. Sm.) "Bronze." Introspection: "First strong visual impression of the typewritten word and its color. Then came the word 'bronze' in the form of inner speech and at the same time a rather imperfect image of one of those big bronze colored turkeys. The color was more distinct than the outline. Not well localized, hovering somewhere around in the air. The color came out distinctly, the shimmer of the iridescent color. Considerably later, *i. e.*, after the shutter was closed, there came the thought that wild turkeys were once abundant in New England, but now almost extinct. Then came the idea of Thanksgiving, but not well defined, just a general idea of festivities."

§6. IMAGES WITH UNFAMILIAR STIMULI

It is known in a general way that the grades of acquaintance, *i. e.*, familiarity and unfamiliarity, with stimulus words or phrases have an important influence on the modes of reaction. Here we propose to examine in particular their influence, especially upon images.¹

By unfamiliar stimuli is meant here those words or phrases in the case of which understanding either did not occur directly (soon after the sensory reproduction of the stimulus) or did not occur at all.

The criterion is thus totally subjective (*i. e.*, according to the observers' modes of reaction) though a number of so-

¹ Their influences on the "feelings", we shall consider later in Part III.

called unfamiliar as also familiar stimuli¹ were provisionally fixed and used by the experimenter.

Some of these objectively fixed unfamiliar stimuli were naturally, by some observers, found to be familiar and some of the objectively fixed familiar stimuli were found by other observers to be unfamiliar, so that the following account of the influence of unfamiliar stimuli is taken from the results of all experiments (as we have seen in the treatment of the images of stimulus words).²

Results. The following results show that there is a striking similarity in the conditions of some images which attend the reactions to unfamiliar words and of those attending unfamiliar phrases.³

The influence of unfamiliar stimuli upon the the images (auditory, motor, and visual) of the stimulus-words, such as their increased frequency, accentuation, repetition, etc., we have already seen in Part I, § 1. The tendency to such imagery already exists in normal reactions, and merely becomes accentuated in difficult reactions owing to the retardation of understanding.

A more important and characteristic influence of an unfamiliar stimulus is its awakening of intermediary (or, preceding suggested) images which were 1, klang-associations, 2, paraphrases, 3, memory images, and 4, synonyms.

1. *Klang-associations.* With absolutely unfamiliar words there occurred quite frequently klang-associations. In the case of some stimuli, different observers had often the same associations: such as, *nosology*—*nose*, *mousquetaire*—*mosquito*, *pistology*—*pistol*, *hyle*—*hyla*, *cabala*—*cable*, *timbrel*—*timber*, *timbre*—*timber*, *synergism*—*sylllogism*, *monad*—*Monadnock* (a mountain in N. H.), etc.

Examples. *Nosology*: (Obs. L. M. III—i, 5). "The pronunciation suggested 'noseology'. Then I found myself saying, 'nose-ology', which made me laugh. The mind was blank. I hadn't any effort or tension, but rather relaxation. I had a feeling of the amusing, comical."

Nosology. (Obs. Ch. III—i, 5.) "First feeling of total unfamiliarity. But this unfamiliarity was a little bit different from the first one because I recognized the first part of the word. I pronounced it two or three times. The word first suggested nose and made me think of a science of the nose, which I knew, of course, was not the correct meaning of the word."

Hyle (Obs. L. M. III—i, 1). "I got no reaction. I just found myself saying 'hyla', 'hyla'. There was a great deal of tension."

Hyle (Obs. Sn. III—i, 1). "I was attending to the movement of apparatus just before. Then as soon as the word appeared I pronounced it men-

¹ For examples, see Introduction.

² Part I, §§ 1 and 2.

³ Ribot states that he found practically the same conditions of imagery in both word and phrase reactions, and so dismissed the latter in his later experiments. Cf. *op. cit.*, p. 114 ff.

tally several times. My first thought was that it was connected with hyla, a tree-frog. And then I read it again and thought you gave it because of its philosophical meaning—the word is the same as the Greek ὕλη which would be spelt in the same way. And after that I repeated it several times and was repeating it. There was feeling of concentration particularly marked.”

With unfamiliar phrases, however, this form of association by similarity of mere sounds, perhaps something like parody, did not occur.

2. *Paraphrase.* With unfamiliar and apparently compound words, it was a common tendency to analyze them first into familiar elements and then to make out the meaning of the whole. For instance, *synergism*: syn-energy “working together”; *ultramontanism*—ultra-mont-ism= “doctrine beyond the mountain”; *pachydermata*: pachy-derm-ata= “a class of thick-skinned animals”; *Millenarism*: Miller-ism= “a doctrine of Miller,” etc.,

Example: *Millenarism*. (Obs. Ch. III, ii, 17, Time—(—.¹) “Read the word through half a dozen times and at the last time I divided the word into two syllables. Feeling of effort throughout the whole experiment; tension and the same feeling of hunting. The suggestion that came to me was a man named Miller who had a peculiar theological doctrine something about the end of the world at a certain time, I think. And so the feeling was not a feeling of total strangeness, but it was a feeling of recognition of the word. I suspected the word was probably constructed after the name of that man and stood for his system. Feeling of unpleasantness attached to the strain. Feeling of uncertainty and ignorance. The mind is not yet quite free from work. There seems something still working.”

Pistology. (Obs. Sn. III, ii, 7, Time—(—.) “Read the word in inner speech and tried to think of what it could possibly mean. I had that feeling of strain, of unfamiliarity, and then I began groping about. I looked at the first part of the word and recognized the word ‘pistol’ there, and then, I think, I formulated it in inner speech as ‘the science of pistol.’ And then I rejected that. At the same time there was some sense of humor. Then the words ‘science of fishes’ came perhaps by way of analogy with the word ‘piscatology’ (this word did not come into consciousness). But I realized that that is not the meaning of the word. And so I was still trying further and was thinking that I was not able to make out what the word was when the shutter was closed. A feeling of unfamiliarity, and a feeling of groping about for something were there, but the feeling of unfamiliarity was the only one which was in the centre of consciousness. There was also a certain feeling of helplessness though not clearly developed. These feelings of strain and effort passed off more gradually this time than in the other one. There was a little curiosity whether it was not a nonsense word.”

With unfamiliar and difficult phrases, this tendency to paraphrase was more frequent and common than with words. An important feature is the fact that here two kinds of intermediaries, a verbal and a visual, with rather definite individual

¹ The sign “—” signifies that the understanding did not take place within 5 seconds. For details see Introduction.

differences, were pretty clearly brought out. In the case of the verbal intermediary, the mind works mainly with synonyms, for the principal words in a phrase, or with inner speech in the making out of the meaning. There is seldom any trace of visual images of objects.

For instance: "*Truth seeks no corner.*" (Obs. Ms. ph. 4. Time—) "Read it in the same way as before. Turned back to the two words 'truth' and 'corner'. I had no visual image. From the word 'corner' the words 'square place' came by association. Interpreted 'Truth spreads itself.' There was a slight feeling of effort or tension. The mental operation stopped with the understanding."

"*A sin confessed is half forgiven.*" (Obs. Cf. I, Ph. 7, Time—.) "A little doubt still remains with this too. Some almost audible inner speech with distinct articulation and movements. A rapid comparison with the last one but no pronunciation of it. Everything was almost auditory, i. e., words dealing with an imagined sin of a child who confesses to his father some fault he had done. That kind of thinking or imagination seems to bring forth the meaning, namely: 'If you tell him about your wrong yourself, it wakens the good disposition of the person you have offended'."

In the case of the visual intermediary, the mind works mainly with more or less vivid visual images of objects designated by the principal words of a phrase, or with visual imagination, in the making out of meaning.

For instance: "*Riches have wings.*" (Obs. Kn. I, Ph. 3, Time—.) "Internal reading. Then I had a very clear image of a bird with wings. Then the image of the flying away of the bird, which brought the idea, not image, of the going away of riches. Then the feeling of the conviction that the problem was correctly understood. This feeling was accompanied by a peculiar feeling of relaxation and ease."

"*Truth seeks no corner.*" (Obs. Hi. I, Ph. 4, Time—.) "Inner reading with movements of speech organs as before. I imagined and constructed a square in my mental vision. Then smoothing the four corners of the square I shaped it into a circle, and got the following interpretation. 'Truth is perfect.' (After having reported his introspection, the observer confessed that he began to doubt about his interpretation.)

With some few observers the use of one of these types of imagery was so constant and so firmly established that they seldom went over to the other form, regardless of the concreteness or abstractness of stimulus.

An extra observer had visual (or concrete) intermediary imagery nearly all the time as shown in the following protocol:

Obs. Osb. Ph. No. 1. (*Union is strength*) 3" (stimulus spoken). "Saw white grasping hands, immediately followed by the recollection of the scene of the bridal ceremony in Longfellow's 'Launching of the Ship.' Then I had the sense."

Ph. No. 2. (*Use makes perfectness*) 3" (spoken). "I had a mental image of each word in the sentence. The style of letters appeared in the form between printed type and handwriting. Then followed the visual image of a vague shadowy human figure. Then the meaning.

Ph. No. 3. (*Riches have wings*) 4" (spoken). "Spoken sound remained. I had a mental image of hunting, and saw the white wing of a bird. Then the meaning flashed in.

Ph. No. 4. (*Truth seeks no corner*) 1" (spoken). I had an image of a corner. There was no repetition of the heard words. I paid very little attention to the words. The sense flashed.

Obs. *Cff.* on the other hand, had verbal imagery or inner speech in most occasions in the understanding of unfamiliar phrases.

Several of the other observers approached, in varying degrees, to one or the other of these extreme cases, while the rest represented the middle or neutral class, having no special preference or inclination to either sort of imagery. It was the imagery of this last class that was influenced markedly by concreteness or abstractness in the stimulus.

Here we have, therefore, in these images a pretty definite and also rather important criterion—important because it directly concerns the thinking—for individual differences. The general tendency seems to be that the frequency of verbal and visual intermediary images corresponds nearly to that of verbal and visual suggested images in cases of easy understanding.

3. *Memory images.* If the words or phrases were such as had been experienced once, or a few times, before, memory images often occurred in the form of the recollection of the circumstances under which the words had been experienced, regardless of individual differences and of the concreteness or abstractness of the stimulus words. This kind of memory images usually preceded the understanding, but sometimes succeeded or occurred simultaneously with it.

Example: *Synergism.* (Obs. *E. M.* iii—i, 10.) "First a visual impression of the word, then the pronunciation of the word. Then I saw vaguely the place in a book where the word was treated, but the meaning did not come to me. There was quite a noticeable feeling of strain on account of my hard effort to recall the subject of the treatment in which the word appeared."

Noumenon. (Obs. *Ky.* II, w—19.) "First the tendency to pronounce. Then the realization that it means the opposite of phenomenon came. It reminded me that I looked up that word in the dictionary about two months ago. I had a distinct visual image of the place; I had been looking at the dictionary in the library."

Thinking is so hard that many prefer judgment to it. (Obs. *Ac.* III—iv, 9, Time—3.0"). "I read it and the meaning flashed into my mind at once. But it was just a feeling. Then I had a very vague image of the lecture room and of Dr. S. I felt the statement to be easy and reacted. After I had reacted, in second thought I found it was not sure. The reason of the occurrence of this image is that Dr. S talked about the difficulty of thinking in common people who would rather decide without thinking. I did not recall the idea of it very clearly, whence my hesitation afterward. The tension was only kept up while I was reading and considering. With the reaction it went away and some sense of satisfaction came with it. But it was soon dispelled by the sense of uncertainty and its accompanying feelings which persisted as in other cases of difficult reactions.

The frequency of such memory imagery, with not quite familiar words or phrases, is well known to every one of us especially in the study of a new language. With frequent repetitions these definite associations fall away giving place to mere feeling of recognition or of familiarity.

4. *Synonyms*. A. *With words*. With rather, but not quite, familiar words, there occurred sometimes other more familiar verbal images having similar meanings, or synonyms in widest sense. They were synonyms proper, definitions, and translations.

a, Synonyms proper, or words having similar meanings.

Apperception. (Obs. *St.* II, w—18.) “There was a slight surprise. The word was familiar. It brought the word ‘attention’. Then I thought of Dr. S explaining the meaning of the word as mental grasp of the whole. I visualized Dr. S in his recitation room.”

b, Definitions: This form occurred especially with technical terms, such as, apperception, parallelism, noumenon, etc.

These forms occurred mainly in observers belonging to the verbal type. The observers belonging to visual or concrete type visualized, in such cases, a concrete instance mostly in the form of memory imagery.

For instance: *Parallelism*. (Obs. *Ac.* II, w—32.) “I spelled and pronounced the word mentally. I saw mentally Dr. S drawing on the black-board the diagram on parallelism, and speaking of the theory, of the statement of the relation between body and mind.”

c, Translation. With foreign words this form frequently occurred regardless of individual differences.

Color. (Obs. *Kn.* I, w—10.) “Sound continued. Translated into Japanese ‘iro’ which was internally spoken. Then the understanding, and I thought of the red color of this card-box on the table.”

B. *With phrases*. With unfamiliar phrases there occurred similar forms of synonyms nearly in the same way as in the case of words.

a, Similar phrases.

Example. *A chariot will not go on a single wheel*. (Obs. *Cff.* I, B—I, Time—.) “I tried to recognize the phrase, but failed. Then I recalled a similar expression, ‘A college without a library is like a wagon with three wheels.’ The situation in which I had heard the proverb came into my mind. I had a slight vague image of a chariot as described in a book. Then I tried to compare two wheels to two qualities in a person’s nature, which balance each other. The word ‘balance’ was internally spoken. I decided that the only meaning I can get out of it was that ‘Balance is necessary for success.’ The sentence was internally spoken. Feeling of dissatisfaction with reference to my explanation. A feeling that something is wrong with my interpretation.”

The translation of foreign phrases was quite common.

For instance: *Laborare est orare*. (III—ii, 6. Obs. *Ch.* Time, 1.9”) “First read it through and understood it without translating it. The under-

standing was not complete, so I read it second time translating into English and I got the sense. I experienced two sorts of certainties, the certainty about my knowledge of the Latin words, that is about what they mean in English, and that of the sense. I was at the beginning a little surprised to find a Latin phrase."

To conclude: Unfamiliarity with the stimulus has an important influence on the frequency and kinds of images.

1. Unfamiliar stimuli accentuate the images of the stimuli in general.
2. Intermediary images in the forms of klang-associations, memory images, synonyms, translations, definitions, etc., are direct results of unfamiliarity.
3. In the paraphrase, there is a marked tendency to individual differences in the use of verbal and visual intermediary images.
4. The kinds and conditions of intermediary images both with unfamiliar words and phrases seem, in the main, nearly the same.¹

§ 7. AUSFRAGE METHOD AND THE CUSTOMARY METHOD IN STUDIES OF ASSOCIATION

The results of our study lead to the belief that the Ausfrage method, such as was applied in the above study, is more adapted, in its passive form of reaction, to the study of the actual phenomena of association than the customary method of the so-called association-experiment, because it has the following advantages over the latter: 1, Naturalness of associations; 2, Clearness of the term suggestion; 3, Introspection; 4, Change of conditions. The customary method lacks almost all these conditions essential to the study.

1. *Naturalness of associations.* The observer has only to remain passive to the stimulus letting the associations or suggestions go as they occur without interruption or disturbance by will. With the customary method, on the contrary, the course of associations becomes complicated or jeopardized in a double way: 1, By the observer's mere intention or will to fulfill the artificial requirements of the experiment, and 2, by the actual fulfillment, of them.
 - a*, The reaction must be given in one word;
 - b*, The reaction-word must be different from the stimulus-word;
 - c*, The reaction-word must stand for the first association;
 - d*, The reaction must be as quick as possible.
 It is clear that the mere idea of fulfilling these numerous requirements is itself sufficient to change the observer's attitude from a passive or neutral state to an active or selective one. As to the results of actual fulfillment of requirement *a*, it may be asked how, in case the observer has as an associated idea, a complex visual image or memory

¹For the conditions of concomitant feelings see Part III, § 3.

image, he could express them in a single word without selecting at random the name of one of the represented objects or a part of one or some idea such as could be promptly expressed. Of requirement *b*, it may be said that the association existing between an image and its name (as well as that between a perception of an object and its name) is one of the strongest; and the two operate reciprocally; a name usually calls up its object-image and the object-image usually calls up its name. When a name calls forth its object-image in the observer's mind, the natural tendency is to name it again. But this tendency must be checked, for a reaction by repeating the stimulus word is forbidden, though, in such cases, it is psychologically quite different from mere mechanical repetition or imitation of speaker's voice. The result of the fulfillment of the requirements *c* and *d*, *i. e.*, of "the first association" and of "promptness," is that the majority of reactions will necessarily consist of independent verbal associations or what Wundt calls articulatory or pseudo-associations (*Scheinassoziationen*), since they are in general the first to arrive, but are deprived of all psychical traits.

2. *Clearness of the term "Suggestion."* Of whatever kinds they may be, all conscious events are "suggestions" when they succeed the perception of the stimulus-word. Their classification and sorting and sifting are all left in the Ausfrage experiment to the experimenter. The observer has only to state all he has experienced in a certain interval of time, and there is no room for ambiguity in the meaning of terms as such. The term "associations," as it is used in the 'instruction' in the common association experiment, is, on the contrary, ambiguous and capable of more than one interpretation. It may mean purely articulatory associations. It may mean "real" associations *i. e.*, those with object-images. It may mean associations between two object-images, as in the case of so-called "association of ideas." Finally, it may mean the mixture of all these, the most natural to occur in real associations. Not only does each observer differ in these varieties of possible interpretations, but also one and the same observer may fluctuate, sometimes voluntarily sometimes involuntarily, from one to the other of these interpretations according to circumstances.¹

¹Sometime ago, to see how far the results would differ in the same observers according to the differences of these interpretations, I made tests with several observers, in the first series of which the observers were requested to react under the conditions of the traditional association-experiment. In the second series, they were required to react, if possible, after having some suggested object-images or ideas. The protocols, which were taken by the observers after each reaction, show the result that in the first series

3. *Introspection.* In such complex processes as word-reaction, nothing gives a more direct and trustworthy account than the introspection of the observer himself. Objectively alone (*i. e.* without this essential help of introspection), it is almost impossible even to distinguish an immediate, or articulatory reaction from an intermediate, or object-reaction, not to mention the tracing of the same reaction-words to different sources, or of any further exploitation of associations in general.

4. *Change of Conditions.* The occurrence of a special association or suggestion to the exclusion of others is directly conditioned by the resultants of the three factors: Procedure of experimentation, Kinds of material, and Individual differences. Change of conditions reveals to us the real causes of certain forms of associations, which is not only ignored by, but also will be difficult for, the customary method because of the complication of many other factors such as were mentioned in item 1.

So much for the comparison of the new and the customary method in their application to the study of association. The disadvantages of the latter are clear.

On Association Experiments in Applied Psychology

No one can deny that some important contributions to psychology as well as to practical life have come from association experiments in applied psychology. Their method, however, is not absolutely free from weaknesses, as it is based on the same principles as the preceding.

Its study of individual differences of normal and abnormal mentality consists of two processes: 1, The collection of a number of reaction-words by the customary association method; and 2, the interpretation of the reaction-words. This is undertaken as follows: First, such a logical scheme or classification of associations (according to the conceptual relations of the reaction-words to the stimulus-word) is prepared, as will comprehend all possible forms of reactions under these categories. Then the relative frequency with normal subjects of associations of the different sorts thus classified is taken and serves as a standard with which to compare the frequency with abnormal subjects. Now, regarding some of the interpretations or generalizations attained through

the reactions consisted of diverse kinds of imagery, with the majority of articulatory associations (purely verbal). In the second series, the majority of the reactions consisted of memory associations. This illustrates how easy it is to get totally different kinds of associations from the same observer by the mere difference in the interpretation of the term "association."

such steps the following remarks may be made. In the generalization that children, imbeciles, idiots, epileptics, etc., react frequently in phrase form, whereas with adults and normal persons this form occurs very seldom if at all, the probable interpretation is that the former do not perhaps understand, or forget, or neglect the requirement for the use of a single reaction-word, whereas the latter observe the rule. This fact of disobedience, etc., itself may sometimes be regarded as a sign of abnormality, etc., but nothing more, because phrase associations are quite natural and frequent under certain conditions, as is shown in our study. In like manner, the generalization that children and imbeciles, etc., react frequently by egocentric associations, whereas normal persons react very seldom, if at all, in this form, cannot be interpreted as an expression of a fair comparison of the actual associations, because a single word by itself seldom furnishes a clue of egocentricity to an onlooking psychologist, unless it is accompanied by a personal pronoun or some other word, that is, unless it is put into a phrase form which a normal person suppresses. This fact perhaps accounts for the exceedingly small number of egocentric or personal associations with normal persons which is reported in these studies. In some cases its frequency goes as low as the ratio of once in two thousand reactions.¹ In fact with passive reactions in our experiment and according to the direct report of the observers, this form, which is merely our memory imagery,² occurred in the ratio of once in every two reactions. A large discrepancy indeed!

Reactions by repetition of the stimulus word, which are regarded in association studies, as characterizing the reactions of children and imbeciles, etc., were found as common and natural associations with normal subjects in our experiment, as was just stated. Reactions in the form of explanation or definition, another characteristic of children, imbeciles, etc., were often found in our experiments, especially when the stimulus word was not quite familiar or it was a technical term of the meaning of which the observer was not perfectly sure. So that this tendency to explanatory reaction can hardly be regarded as more than an indication of the degree of acquaintantship with words, *i. e.*, literacy or illiteracy.

To sum up, these so-called characteristic forms in children and the abnormal can all be found in normal adults in their natural associations, *i. e.*, when they react according to natural

¹Jung und Riklin: Diagnostische Assoziationsstudien. Leipzig, 1906. Cf. p. 108.

²"Die Einstellung ist eine egozentrische, in sofern das Reizwort vorzüglich subjective Erinnerungen anregt." *Ibid.*, p. 117.

and spontaneous suggestions, as was the case with our experiment, and do not react according to artificial and "sophisticated" associations, *i. e.*, by mere verbal associations, as is the case in the customary experiment with normal observers who are expert enough to obey the "rules."

Remarks on association experiments as a means of diagnosing crimes as well as diseases. The criteria for a so-called significant or critical reaction are: 1, Prolonged reaction time, considered as due to the disturbances of the "emotional complexes"; 2, Apparently unconnected reaction words (having no conceptual connection with stimulus) considered as a "*Deck*" or "evasive" reaction, when the experimenter is unable to account for it, and as a suspicious reaction when he is able to do so. Sometimes a succeeding reaction is examined according to these criteria, on the ground of the phenomenon of "Perseveration." The final or crucial test is furnished by the confession of the (supposed) criminal or patient.

Now, most of our cases of dependent verbal imagery accompanying memory imagery, if they alone were announced by the observer (*i. e.*, memory associations), no matter whether they are emotional or neutral, significant or insignificant, would satisfy the two conditions just mentioned, for they were slower than the simple articulatory associations and lacked, as a rule, *logical or outward connection to stimulus words*.¹

These criteria are thus helpless in the distinguishing of emotional or significant memory associations from neutral or insignificant memory associations. They are effective only when the observers always react in the form of articulatory or purely verbal associations with insignificant words and in the form of memory associations with significant words. This may naturally occur in laboratory tests, as the observers are trained to articulatory reactions with ordinary words, and are naturally struck by recent memory associations of a few minutes date which, of course, are the strongest and most likely to revive, no matter how insignificant the events were. But

¹Experiments were made recently by Yerkes and Berry (*Am. J. of Psychol.*, Jan., 1909) and also by Henke and Eddy (*Psy. Rev.*, Nov., 1909) to test the certainty of the diagnostic method in the discovery of certain acts executed by the observers shortly previous to the tests, with the same results in both studies, namely: that the method was certain when it had to do with the determination of two alternatives, even if the observers sometimes tried to "fool" the experimenters. In these cases, it must be remembered, we are not dealing with the two forms of reactions, *emotional* and *neutral*, as is commonly presumed, but, in fact, with only the two forms of reactions, *articulatory* associations and *memory* associations (in these cases, with very recent memory associations), as also is plainly seen in the reading of the tables and introspections in these articles.

such is hardly to be expected in the case of patients and criminals in actual practice, because they may be expected to react very frequently in the form of real or memory associations to ordinary words.

PART III

ANALYSIS OF THE SIMULTANEOUS CONCOMITANTS

The foregoing studies have dealt with the conditions of the frequency of images which either preceded or succeeded understanding. In this last part of the study I shall examine the nature of "meaning" as a simultaneous concomitant of understanding, tracing up the following three questions. 1. Whether the concomitants precede or succeed or occur simultaneously with understanding. The preceding and succeeding concomitants may be eliminated from the experience of understanding itself, whatever relations they may have to the latter. 2. Whether or not the simultaneous concomitants are peculiar to understanding or meaning. Those which occur as fully even when there is no understanding may be eliminated from the characteristic constituents of meaning, no matter whether they are constant or not. 3. Whether or not the constituents of meaning can ultimately be reduced to the psychological elements, *i. e.*, pure sensations and feelings. The protocols of the foregoing experiments directly answer the purpose of the first question, *i. e.*, the temporal succession of the concomitants. For the second question an additional experiment was made. The answer to the third question consists mainly of inferences from all the preceding results of introspections. But before entering on the discussion of our results let us take a glance at the main views on the psychology of thought and especially of meaning held by the modern psychologists to whose work we shall have frequent occasion to refer.

§ 1. AN HISTORICAL SKETCH OF THE VARIOUS VIEWS OF THOUGHT

1. *Thought as identical with concrete representations (images).* Locke speaks of the possibility of our having pure general ideas free from any particular representations, for instance, of "a triangle which must be neither oblique nor rectangle, neither equilateral, equicrural, nor scalenon, but all and nony of these at once."¹ Berkeley who was quite surprised by this conceptualistic view of Locke, says, "the idea of man that I frame to myself must be either of a white, or a black, or a tawny, a straight, or a crooked, a tall, or a low, or a

¹Essay, Bk. iv. ch. 7.

middle-sized man."¹ For him meaning, concept or general ideas, as such, have no psychical existence except in concrete representations.

Among modern psychologists James, siding with Locke in opposition to Berkeley, says, "The note so bravely struck by Berkeley could not, however, be well sustained in the face of the fact patent to every human being that we can mean color without meaning any particular color, and stature without meaning any particular height."²

Binet in regard to Berkeley's proposition takes, like James, the negative side and refers to two cases as an *experimentum crucis* against it, *i. e.*, cases where we have particular and precise images without having any meaning or thought, and cases where we have thought or meaning without having any particular or precise images. He maintains, also, that '*pensée générale*' can be properly explained by neither conceptualism nor nominalism though probably by "intentionalism" which he himself proposes.³ Bühler speaks of both being right and wrong, that Berkeley is right in his negation of sensuous representation of a general triangle, and Locke is right in his assertion of the existence of the pure meaning of a triangle without any sensory element, and also that the question of general ideas is totally different from that of abstract ideas or (his) thought or knowledge (*Wissen*).⁴

2. *Thought as identical with the verbal image.* This question first took its definite shape in the controversy between Max Müller on one side and Galton, Romanes and others on the other. The former maintains that all thinking when introspectively viewed is merely inner speech. The latter refer, to cases of chess playing, of the construction of machines in purely visual terms, and also to the framing or searching for the words for an existent thought, a fact quite common to us, as insurmountable difficulties in the way of this proposition.⁵

Identity of abstract thought and verbal image. Taine speaks of his abstract ideas as quite different from a particular representation or even from the "confused and floating representation of particular *araucaria*," alluding to the general ideas of Galton and Huxley.⁶ He says, "We think the abstract character of things by means of abstract names which are our abstract ideas, and the formation of our ideas are

¹Principle, Introduction, 10, 13.

²*Ibid.*, Vol. I, p. 470.

³Binet A.: *L'étude expérimentale de l'intelligence*, 1903, p. 151 ff.

⁴*Ibid.*, p. 363-364.

⁵Max Müller: *ibid.*, appendix (1887).

⁶*L'intelligence*, II, 139.

merely the formation of names which substitute them."¹ Among present authors, Wundt says, "We do not always think in words; we can easily recall actually experienced or dreamed events in mere visual terms. But with abstract ideas, we usually think in words often involuntarily accompanied by the visual image of the words."² Decidedly opposing this theory, James says, "The opinion as stoutly professed by many that language is essential to thought seems to have this much of truth in it, that all our inward images tend invincibly to attach themselves to something sensible, so as to gain in corporeity and life. Words serve this purpose, gestures serve it, stones, straws, chalk-marks, any thing will do . . . 'The bricks are alive to tell the tale'."³ Bühler refers to the fact that the verbal image occurs in thinking only in a sporadic way and is broken and fragmentary without running parallel with thought processes.⁴ Ribot discards the theory simply as "inacceptable."⁵ The other authors of the school of Würzburg, *e. g.*, Marbe, Orth, Ach, Watt and Messer, seem to agree in the rejection of this theory. On the other hand, recently Dearborn has attributed the utmost importance to verbal images even in the comparison of ink-blots by the eye. He reports that he found in his experiment the presence of verbal images, in cases where the judgments were correct, in all of the numerous observers, except one, who had just a "true feeling" of likeness and unlikeness. This observer was, nevertheless, the most successful of all in the judgments.⁶

3. *Thought as identical with the compounds of the three dimensional feelings.* Wundt calls those "intellectual feelings" which attend complex intellectual processes. "They are in general complex total feelings, into which simple feelings and ideational feelings (*Vorstellungsgefühle*) enter as components."⁷ "The feeling of doubt is an oscillating emotional state (*Gemützustand*)."⁸ The "feeling of agreement (which is a kind of *Vorstellungsgefühl*) is introspectively merely a feeling of relaxation with heightened intensity."⁹ "The feeling of recognition (*Wiedererkennungsggefühl*) is a

¹*Ib.*, I, 1st ed., 254.

²*Grundzüge der Physiologischen Psychologie*, 1902, 5th ed., Vol. III, p. 543.

³James, W.: *Principles of Psychology*, Vol. II, p. 305.

⁴*Ib.*, 317.

⁵"*Idées Générales*," p. 100.

⁶G. V. N. Dearborn: *Experiment on the Judgment of Likeness and Unlikeness of Visual Form*, *Journal of Philosophy, Psychology and Scientific Method*, Feb., 1910, p. 60.

⁷*Ib.*, Vol. III, p. 264.

⁸*Ib.*, 265.

⁹*Ib.*, 510.

subjective symptom belonging not to the ideational processes but to the subjective side of the processes,"—the processes of assimilation of ideas.¹ Its subjective quality "seems a sudden and unhindered change between tension and relaxation, which under circumstances can be joined by other feeling qualities."²

Most of the Würzburg authors discredit this Wundtian view of intellectual or cognitive feelings. Orth in his analysis of "*Bewusstseinslage*" (another name proposed by Marbe for intellectual feelings) as introspectively observed by himself and others while serving as observers in Marbe's study on judgment, finds them related to cognition and therefore implicitly to sensation rather than to feeling, and having reference to the object rather than to the subject.³ Doubt, according to him is, introspectively, thoroughly different from sensations, representations, and feelings proper; and the same with feelings of certainty, contrast, agreement, etc.⁴ "What *Bewusstseinslagen* really are," he says in summarizing, "remains to be investigated. So much seems to be certain, that they resisted our analysis and that they are not at all merely another name for the psychical facts that Wundt comprehends under his two new feeling directions, for this contradicts, not only self-observation, but also their great manifoldness."⁵

4. *Thought as judgment and as knowledge is beyond psychical experience.* Marbe in his study on judgment arrived at the conclusion that "there are no psychical conditions of judgment in general that give them the character of judgment as such."⁶ And the same with understanding of judgment.⁷ Accounting for this, he says, "thus we see very easily that understanding of judgment can never be found in consciousness, because it rests upon knowledge, and knowledge is never given in consciousness."⁸ As the processes of judgment are totally beyond consciousness, so in its study there is as little left for psychologists as of physiological chemistry for chemists.⁹ Later authors of the Würzburg school agree in criticising Marbe's reflexive theory of judgment as due to too easy stimuli. Bühler simply speaks of his "thought" as actual *Wissen* and not such potential *Wissen* as Marbe means.¹⁰ James speaks of his feeling of tendency (such as feeling of familiarity, recognition, etc.) as not a "psychical zero," but a "psychical fact" though vague and difficult to name.¹¹

¹*Ib.*, 536.

²*Ib.*, 537.

³Orth, J.: *Gefühl und Bewusstseinslage*. Berlin, 1903, p. 73.

⁴*Ib.*, 71. ⁶*Op. cit.*, p. 42, 43. ⁸*Ib.*, p. 92. ¹⁰*Op. cit.*, p. 361.

⁵*Ib.*, 128. ⁷*Ib.*, p. 83. ⁹*Ib.*, p. 96. ¹¹*Ib.*, Vol. I, p. 254.

5. *Thought as identical with reproductive tendencies.* Ach calls imageless thought or pure cognition free from any "phenomenological constituents, such as visual, acoustic, kinesthetic sensations or images," "*Bewusstheit*."¹ He says, "When a word, for instance, 'bell' is presented to me and I apperceive the symbol, I understand what it means. I have the *Bewusstheit* of meaning. According to the theory of *Bewusstheit*, it is not necessary for understanding that one have representations . . . such as auditory or visual images of a bell . . . Each representation which is given in consciousness, for instance, the impression of the stimulus word 'bell,' puts, as is well known, a number of associated representations into the state of readiness. This putting-into-readiness of representations, or excitation of reproductive tendencies, suffices for the conscious experience (representation) of what we call sense or meaning."² In criticism of this view, Watt, speaking of meaning as different from the vague, reverberating associations or tendencies, says: "Some maintain that this is a mass of vague associations, word-associations or others, but this is not clear according to the protocol. It rather points to the fact that a concept, such as appear in free self-observation, is something different from vague reverberating associations or a certain number of them."³ Bühler excluding the mere consciousness of tendencies from his 'thought' or 'meaning,' says: "Thought is nothing vague or half-conscious but something clear, and not a sum but a unity."⁴ Titchener speaks of the necessity, in the awareness of meaning, of the co-operation of the both Ach's awareness of reproductive tendencies or 'meaning' and his awareness of relation.⁵

6. *Thought as identical with "fringe"-experiences.* According to James, thought as well as meaning is the feeling of relation which is the felt "glow," "fringe," "echo," or "reverberation" and the transitive experience of mind in distinction to substantive or static experience, *e. g.*, images, sensations, etc. He says, "The meaning of the words which we think we understand as we read, is a sign of direction, . . . or, a bare image of logical movement which is a psychic transition, always on the wing, so to speak, and not to be

¹Ach, N.: Ueber die Willenstätigkeit und das Denken. Göttingen, 1905. p. 210.

²*Ib.*, 216-217.

³Watt, J.: Experimentelle Beiträge zur einer Theorie des Denkens, *Archiv f. d. gesamte Psychologie*, 1905 (4), 289 ff., p. 434.

⁴*Ibid.*, p. 326.

⁵Titchener, E. B.: Lectures on the Experimental Psychology of the Thought-processes, N. Y., 1909, p. 107.

glimpsed except in flight."¹ Further characterizing meaning as feeling of tendencies, he says, "The sense of our meaning is an entirely peculiar element of thought . . . It is one of those evanescent and transitive facts of mind which introspection cannot turn round upon . . . It pertains to the fringe of the subjective state, and is a feeling of tendency, whose neural counterpart is undoubtedly a lot of dawning and dying processes too faint and complex to be traced."² He further characterizes this feeling of tendency as a tendency of a "nascent image,"³ as a feeling antecedent to recall, such as a "ringing in the ear," or "dancing in one's mind" of a forgotten name or word, or of the rhythm of a verse, as the feeling of recognition or familiarity which is a "submaximal excitement of wide-spreading association brain-tracts."⁴

Thus we see Ach's conception of 'reproductive tendencies' is quite similar to the "fringe" experiences of James. Ribot's view seems also to approach these conceptions when he considers meaning or concept as an "unconscious substratum, organized and potential knowledge, harmonics which give detonation to the word."⁵ Hoernle referring to James, says that James reverses the fact of ordinary experiences where "we notice more of meaning than words. Meaning stands in the foreground and images or ideas or sensory elements in the background of consciousness."⁶

7. *Thought as well as meaning as a "transcending" experience.* According to Messer, sensations and sensation-complexes are perceived merely as contents of consciousness; "they exist or do not exist, but do not point beyond themselves; they do not mean." Thought as also perception, etc., on the contrary, possesses a characteristic attribute of 'transcendence.' "No thought thinks upon itself, *i. e.*, on the constituents of consciousness which we can examine in direct retrospection." "He who, thinks," he continues, "that he could sufficiently characterize thought and perception simply by looking at the existent sensations and images, is like one who believes he could find the value of money by merely examining its material."⁷ Further, in regard to the experience of understanding or meaning, he distinguishes two forms attending the reaction to the same stimulus word: 1, general understanding which is further unanalyzable; and 2, more conscious and definite understanding which, he says, sometimes is "not conditioned by the *Aufgabe* [problem or instruction], but is such as would be explained by the predominance

¹*Ib.*, Vol. I, p. 253.

²*Ib.*, Vol. I, p. 472.

³*Ib.*, Vol. I, p. 254.

⁴*Ib.*, p. 258.

⁵*Ib.*, p. 132.

⁶*Mind*, Jan., 1907.

⁷*Ib.*, 113.

of the reproductive tendencies in the general constellation."¹ But "the reaction wherein the *Aufgabe* enters and the acts of acceptance and rejection take place, apparently cannot be explained by the mechanism of mere reproduction and association, and herein lies the justification for distinguishing the processes of thought from those of pure associative reproduction."²

8. *Thought as a third psychical element.* Bühler, as the result of his study on thought, came to the conclusion that thought-experiences are neither analyzable to sensations nor feelings but so unique and specific that they should be considered as compounds of a third psychical unit or element, i. e., *Gedanke*.³ Thought, according to him, is act of knowing (*Wissensact*).⁴ Meaning, which is a conscious knowing, cannot be represented, but only known.⁵ He says that to ask one to explain knowing or thought merely by the terms of the quality and intensity of existent sensations is the same as asking one to explain depth by the terms of height and width.⁶

9. *Thought as indescribable.* All the preceding authors who regard thought as something different from image or feeling proper, agree in finding it as further indescribable. Marbe, in regard to his *Bewusstseinslage* speaks of conscious facts whose contents either totally escape from further characterization or are difficult to approach. Orth says, "Those *Bewusstseinslagen* which were observed by Marbe and by us are of diverse kinds and have only this point in common that they represent psychical facts which could not be further analyzed by us."⁷ Ach says, the description of these *Bewusstheiten* by the observers is very difficult because of the difficulty of verbal expression, as they lack "phenomenological representations" (sensations and images, etc.).⁸ Watt, toward the end of his study says, "An analytical introspection in this direction is exceedingly difficult . . . We know psychologically as much as nothing about the nature of meaning-consciousnesses which accompany an abstract word."⁹ Messer speaks of thought-experiences as further unanalyzable. James speaks repeatedly of the difficulty of description of fringe-experiences; their multitudinous nuances or configurations can be only felt.

10. *Thought, also meaning experiences, as identical with kinesthetic images.* Taking a quite different view from the preceding authors, Titchener, in his recent book on thought-processes, declares that all these authors or their observers who find thought-experiences something different from the

¹*Ib.*, 82.

²*Ib.*, p. 122.

³*Ib.*, p. 329.

⁴*Ib.*, p. 361.

⁵*Ib.*, p. 363.

⁶*Ib.*, p. 361.

⁷*Ib.*, p. 70.

⁸*Ib.*, p. 41.

⁹*Ib.*, p. 435.

existent elements, *e. g.*, sensations, images, etc., are victims of stimulus-error; that they do not separate or abstract what they infer from what they actually experience or have, but think them together, just as an observer in color-experiments, instead of reacting to an abstracted red sensation, reacts to the red paper, an object, the result of both sensations and inferences; and that the results of their introspections are mere intimations or indications, and not the descriptions of what they have experienced.¹ Referring to James's feeling of relation, he says "the phrase 'feeling of relation' is no more unequivocal, as a psychological term, than the phrase 'idea of object' or 'consciousness of meaning.' It carries an intimation, an indication, a statement-about; it does not describe. And the question for psychology is precisely that: what we experience when we have a feeling of relation?"² The consciousnesses of thought when described are merely kinesthetic images or sensations. All other consciousnesses are not the direct data of introspection but the results of addition by reflection and inference.³ "And all such 'feelings,' he says, —feelings of *if*, and *why*, and *nevertheless*, and *therefore*, normally take the form, in my experience, of motor empathy. I act the feeling out, though as a rule in imaginal and not in sensational terms."⁴ Regarding the distinction between kinesthetic images and sensations, he says, "Actual movement always brings into play more muscles than are necessary, while ideal movement is confined to the precise group of muscles concerned." "The sensed or actual nod (that signifies assent to an argument, and frown (that signifies perplexity) are coarse and rough in outlines; the imagined or mental nod and frown are clean and delicately traced."⁵ He wonders why James does not take the same introspective view of his 'feeling of relation' as he does with the feeling of a 'central active self' in which he (James) finds nothing but 'bodily processes for the most part taking place within the head.'⁶

§2. CONTENTS OF MEANING WITH FAMILIAR STIMULI

What are the actual contents of consciousness at the instant of understanding, the direct psychical experiences which constitute the experience of understanding familiar and easy words or phrases? The protocols of all the foregoing experiments show that there was not one kind of such content only but several. Arranged according to the general order of succession or quickness, they were: 1, Feeling of familiarity or recogni-

¹*Ib.*, p. 145.

²*Ib.*, p. 185.

³*Ib.*, p. 185.

⁴*Ib.*, p. 186, 187.

⁵*Ib.*, p. 20-22.

⁶*Ib.*, p. 30.

tion of the stimulus; 2, Feeling of concept; 3, Feeling of content; 4, Feeling of direction; 5 Half-developed or indefinite images; and lastly 6, Fully developed or definite images.

1. *Pure Feeling of Familiarity.* With a very familiar word or phrase, or in repeated reaction to a stimulus previously understood, the occurrence of just the feeling of familiarity alone or the recognition of the stimulus as the one understood before, was sufficient to release the reaction or cause the stimulus to be felt as understood.

For instance: *Mountain.* (Obs. Sn. III—ii, Time—0.9''). "I read it in inner speech and reacted as the word seemed familiar to me, *i. e.*, when the feeling of familiarity came. I didn't get any further meaning. No imagery, no associations until after I reacted."

Psychology. (Obs. Ch. III—iii—15, Time—0.5''). "The first feeling of recognition of the form of the word was followed instantly by the feeling of familiarity. There was no imagery. In this particular case it appears that the feeling of recognition and the feeling of familiarity are the same thing. There wasn't any imagery, any attempt to define. I recognized the word. Absolute certainty as to understanding."

This type of meaning was quite common and frequent with all observers and regardless of the concreteness or abstractness of the stimulus word. It was the first and quickest to occur of all the types of meaning. It seldom occurred, however, with the mere visual perception of the stimulus word or phrase. Audito-motor reading of the stimulus was necessary to release the reaction even in this type. In active reactions and with familiar abstract stimuli, it was seldom followed by any suggested images in any observers. In active reactions with familiar concrete stimuli, it was sometimes followed, especially with observers of concrete (or visual) type, by suggested images which, however, always occurred after the reaction. And such was the case with all the passive reactions where the suggested images made the terminus of the reaction occurring long after the entrance of the feeling of familiarity or recognition.

2. *Pure feeling of Concept or Meaning.* In the preceding case both sensory and conceptual familiarity or recognition fused so closely together that there is difficulty of analysis, though sensory familiarity evidently predominates in such reflexive reactions. With less familiar stimuli, or when the observers waited longer with very familiar stimuli, these two generally became separated and occurred in succession, the sensory recognition always preceding the conceptual.

Example: *Pomology.* (Obs. Ac. II, w—10.) "Recognized the word and thought it familiar, but on closer examination, I found that I could not understand its meaning."

Heaven, (Obs. Cf. II, w—5.) Did not apperceive the word for a minute. I was not quite attentive. Then I got a purely verbal meaning of it without imagery. By verbal meaning I mean I first recognized it. Then I

had a slight feeling. It was not at all a sort of tridimensional feeling, but an idea of something sacred. But I call it a feeling because it was not definite."

In its frequency and conditions of occurrence, this type of meaning was practically the same as the preceding one except that the latter always preceded the former in case of concurrence.

3. *Pure Feeling of Content.* To this belong the experiences which the observers expressed as "full of meaning," or "content," having "rich associations," or "coming associations," etc., which were accompanied by no particular images or associations. The chief marks were the richness and poorness of content. A feeling of rich content was generally found with stimuli designating topics which observers were interested in or familiar with, and a feeling of poor content with the stimuli indicating uninteresting or unfamiliar subjects.

Example: *Peace.* (Obs. Sn. III,—iii—5. Time—1.0'') "I read it in inner speech. But the inner speech was not very clear this time. And I think, I had a feeling of the meaning of the word. Whether it was different from the feeling of familiarity I am not sure. But it seems to have been something more than a mere feeling of familiarity. This something may be some feeling of moving toward something, or of some possibility of development and is very hard to describe."

House. (Obs. Cff. I, w—3.) "Perception of my voice [inner speech]. Then came the feeling of familiarity. That feeling seems to me to be composed of various kinds of images not yet actual. I would call it almost composite. If I should think about it longer I would have some particular images out of it."

4. *Feeling of Direction.* This feeling is the experience of the mind's pointing to or turning in the direction of the place where a particular object or event referred to by the stimulus was experienced. It is an incipient form of object imagery.

Pedagogy. (Obs. Sn. III—i—14.) "I read the word in inner speech but not very loud and was not quite sure whether I read it correctly. So I read it again and had a faint feeling that I knew the word. Then I thought of the direction of the Dr. B's room and probably also had a very vague suggestion of Dr. B himself. The consciousness of direction was very clear. I had the word 'teaching,' probably in inner speech."

Example: *Head.* (Obs. Cff. I.) "Always an after effect of sound. I listened for the after effect before the recognition of the meaning. Then came the feeling of familiarity followed by a vague idea, almost a feeling of location of upward, top of human head, idea of something above. I had no definite image."

This experience occurred frequently, especially among observers belonging to a rather non-visual type. In passive reactions, and especially with observers belonging rather to the visual or concrete type this experience was, in general, replaced by rather fully-developed object images.

5. *Half-developed Images.* These were faint and vague representations of objects or circumstances, which, on account

of faintness or indefiniteness of imagery, were sometimes termed by the observers "ideas," something "thought of," etc. This was especially the case with a quick recapitulation of many particular past experiences.

Example: *Memory*, (Obs. L. M. III—i, 4.) "First a visual impression of the word. Then reading in inner speech. And then I had a bird's-eye view of all that I have been working at for several weeks; I have that subject. Some pleasure and satisfaction in seeing the word. This word was very full of meaning, but there were no particular visual images. Its meaning could not be expressed in so short a time."

Philosophy. (Obs. Ac. II, w—65.) "I thought of Plato, Aristotle, Kant and Hegel in connection with their productions. No definite visual or auditory elements.

6. *Fully-developed Images*. These are suggested object-images as well as verbal images such as have already been described (Part II, above). They were in general the slowest to occur. They were generally found in passive (or prolonged) reactions and seldom in active (or quick) reactions to familiar stimuli. In case of concurrence with the preceding experiences, they were the last to occur, that is, they made the terminus of the reaction.

Conclusions

1. These results negate the theory of the identity of thought with concrete representations and also the theory of the identity of thought with verbal images so far as meaning experiences are concerned, as these images are a part only of our fully-developed images,—one of the six types of meaning.

2. A chief condition determining whether or not one shall have a definite image (visual or verbal or other), in understanding familiar words or phrases, is the length of time the process continues. If one reacts quickly, *i. e.*, at the stage of familiarity, or concept, etc., one will not have, as a rule, any definite images, regardless of individual differences, and of the concreteness or abstractness of the stimulus. If one dwells longer upon the stimulus one will usually have some particular representations, the majority of which will be recent memorial associations, in predominantly visual form, in the case of visualizers, and in predominantly verbal form in the case of verbalists, regardless of the concreteness or abstractness of the stimulus.

Remark: Ach suggests that pure meaning appears most prominently in the quick reading of a text (*op. cit.*, p. 261). James speaks of the two kinds of meaning, *i. e.*, dynamic meaning which attends the understanding of a phrase and is "usually reduced to the bare fringe," and static meaning which attends the understanding of an isolated word and is usually accompanied by object-images when the word is concrete and by nothing except word-images when it is abstract." (*op. cit.*, p. 265). Wundt says, "Whether the complication of these elements, ideas, word-sound and word-

script, occurs completely in our consciousness depends besides on which of these elements acts upon us directly in sense perception. The ideas can stay isolated under certain circumstances. The word-sound generally calls forth the object-image. The word-script awakens the word-sound with the object-image." (*Op. cit.*, vol. III, p. 543.) John Mill commenting upon Locke and Berkeley's difference of opinion, says, "While the concentration of attention lasts, if it is sufficiently intense, we may be temporarily unconscious of any of the other attributes, and may really for a brief interval have nothing present to our mind but the attributes constituent of the concepts." (Examination of Hamilton, p. 393.) This last view seems to come the nearest to the above result of ours if we change the indefinite expression "intense" in the quotation into "brief".

§3. SELECTIVE EXPERIENCES WITH UNFAMILIAR STIMULI

In the understanding of unfamiliar stimuli where the meaning did not come promptly there appeared in consciousness a new group of experiences in the form of judgments, *i. e.*, of approval or rejection of the contents or suggestions as right or wrong. They were experiences or consciousnesses of searching, waiting, selection, rejection, certainty, uncertainty, hesitation, etc., generally attended by feelings of tension and relaxation. These are sometimes regarded as characteristic constituents of meaning. A special test was therefore made in connection with the third experiment to determine how far these experiences are alike and how far they are different in different types of thinking, *i. e.*, in the understanding of phrases and words and in the identification of non-sense stimuli.

Procedure. In the third experiment, beside English words and phrases, a number of Chinese characters, as a kind of nonsense stimulus, were added. With these characters, instead of understanding, the process was one of identification. The five English speaking observers were requested to compare the second of the two stimuli with the first, or standard, and to tell whether the two were identical or different. The standard was exposed for one second and immediately afterward the comparison stimulus which was sometimes identical and sometimes not identical, but always quite similar in shape to the standard. The reactions, all active, were made by pressing an electric key. Introspections were taken in the same way as with understanding-reactions. Easy and difficult stimuli were made by different combinations of complexity and irregularity in the shapes and in the degree of resemblance between the standard and comparison stimulus. For instance the following are some of the pairs thus matched, having shapes apparently similar but not identical.

巳巳 氷永 尊奠 窮窮

These identification-reactions and the two forms of understanding-reactions, *i. e.*, of words and of phrases, were arranged in such a way that a difficult reaction of one form was followed by a difficult reaction of the other form; and the same with easy reactions. The observers were requested, after giving the introspections of each reaction, to report, in addition, what processes (or experiences) in the two successive reactions they found similar in their abstracted forms and what different.

The following is a sample of such protocols:

A. COMPARISON OF DIFFICULT REACTIONS

Understanding. Nostrum, (Obs. Ch. III—iii, 2, time—2.0''). "Feeling of having seen the word came first. I read the word through once. First suggestion was that of the Latin word. And there I got the meaning of the word but not quite certainly. A little bit of feeling of tension is staying. I was n't quite sure of the content. I interpreted it as a sort of fake medicine."

Identification. 慈藥 (Obs. Ch., time—) "Not sure. What I tried to do was to look at the separation of the figure rather than to judge by general impression, and found that some are the same while others are doubtful. So that the feeling is one of uncertainty, doubt in this case. Also there was a feeling of strain, tension with unpleasant coloration."

Comparison of the experiences. "The feeling of searching for something, of groping is quite similar with the cases of hard English words. And also the feeling of strain, tension with unpleasant coloration, is just the same."

B. COMPARISON OF EASY REACTIONS

Identification. 找戒 (Obs. Ch. time, 1.0'') "Different. The impression came from the general form and not from any one particular line. Feeling of certainty is rather complete. At first there was a feeling of strain and tension which dropped as soon as I reacted. The experiment ended with a little pleasure, because I recognized the difference. So this was a personal feeling attached to the consciousness of success."

Understanding. Peace. (Obs. Ch. time—1.0'') "I read it and recognized it at once. No feeling of tension. There was slight visual imagery. Feeling of certainty as to the meaning of the word. In this feeling of certainty there was the feeling that rich associations could be started."

Comparison of the experiences. "The feeling of certainty with the Chinese characters lacks the feeling of rich content. In the Chinese characters there is a feeling of recognition in the strict sense, while in the English there is no revival of the occasion when I first saw it. Thus the recognition of the Chinese character is much more a matter of sensory form than of content."

Results of the Comparison

A. *Feeling of tension and relaxation.* In regard to the qualitative differences of these feelings, all observers agreed in finding them very similar or even identical in character in the three types of thinking: identification of characters, understanding of words, and understanding of phrases. In

regard to the quantitative differences, they found, as a rule, more tension in difficult understanding than in difficult identification, and in difficult understanding of phrases than in that of words.¹

B. *Feeling of content.* All observers agreed in finding decidedly richer content feelings with words and phrases in general and very poor content feeling or none at all with the characters.² In words and phrases, they found words frequently to have richer content than phrases. The content feeling differed according to the particular words and phrases.

C. *Feelings of certainty and uncertainty, i. e., of understanding and of judgment.* Three observers found these feelings quite similar or identical in the three types of thinking, whereas the other two observers found them rather different, not only among the three types of thinking, but also from stimulus to stimulus in each type of thinking.

It appears that the other two observers, instead of comparing these feelings in their pure and abstracted forms, compared them in their complex and concrete forms. This is plainly seen from the fact that in accounting for the differences they referred either to the differences in content feelings or to those in associations or images. For instance:

Obs. Ch. (III—iv, 2.) Comparison—"As to the feeling of certainty this experience [Chinese character] is very much less complex. It simply consists in the recognition of the visual image and practically no associations at all."

Obs. Sn. (III—iii, 13—14.) Comparison—"This feeling of certainty [with the Chinese character] in my mind is connected with the seeing very clearly the whole space where I expected to see a black spot. The certainty in the case of the word is connected with the feeling of easy association. In this case it is only a feeling of difference."

The following is a typical case of the comparison of these feelings in their abstracted form, which was the method of the other three observers.

Obs. L. M. (III—iii, 3.) "There was no meaning except the visual impression. When my eye traversed the second figure and came to the place where it differs I felt that there was something wrong. And then I called up the visual image of the first one and recognized the difference, with a feeling of certainty. This feeling *itself* is just the same as in the cases of the recognition of English words."

The author thus believes this discrepancy is merely an

¹ The maximum effort or tension was experienced not with absolutely difficult or unfamiliar stimuli but with partially unfamiliar ones. With totally difficult stimuli, observers abandoned the attempt as hopeless or too complex and therefore promptly relaxed.

² When the reproduction of the standard was faint or merely felt, it was sometimes regarded as having a very poor content; when the reproduction was more or less distinct it was regarded as having no content, but simply as an image.

apparent one arising out of the differences in the ways of abstracting the phenomenon to be observed.¹

So much for the experiences compared by all observers. The other similar experiences, which were compared by some observers and viewed as similar, or practically the same, in their abstracted forms, were feelings of searching, groping, waiting and the peculiar, though frequent, experience of the sudden appearance of images or ideas, feelings of satisfaction, dissatisfaction, etc. These results point to the following conclusions: 1. Selective experiences, as also feelings of tension and relaxation, cannot be regarded as either the sole or the characteristic constituents of the meaning of words or phrases, for they were found as well in reactions to nonsense stimuli. 2. On the other hand, as the *feeling of content* was found to be not merely different but totally lacking in the reactions to meaningless stimuli, this feeling may with great probability be regarded as one of the characteristic constituents of the meaning of words and phrases.

§4. ULTIMATE CONSTITUENTS OF MEANING

What are the ultimate psychical constituents of the six types of meaning mentioned above, *i. e.*, can they be reduced to psychological "elements," to three dimensional feeling and sensation having two attributes, quality and intensity, or to a specific image or feeling? This point the observers were not asked to decide. But from the results of all the foregoing study, the writer may make certain inferences. Let us start at the last type of meaning.

(1.) Fully Developed Images. Of these, visual images of objects, verbal images (in audito-motor or visual terms), suggested organic (as well as kinesthetic) images are so clear in their ultimate constituents as to need no comment here. The constituents of memory images were complex and their dominant factors, moreover, varied according to individual observers and circumstances; but, it seems, a visual factor, though sometimes faint and incipient, was a constant one, for a memory image has always a spatial localization, *i. e.*, reproduces the place where the object or event was experienced. The same thing may be said about the constituents of the

¹It is interesting to note that Rousmaniere had the same result in a similar experiment. The report says in part: "The subjects did not agree in their answers to the first problem. Some found not only that the certainty connected with their belief in the results of their addition seemed to be of a distinct type from that connected immediately with the sense of sight itself Others found but one kind of a feeling of certainty." (Harvard Psychol. Studies, Vol. II, p. 279.)

"indicative images" which are the representation of, or a pointing to, the concrete objects near at hand.

(2.) Half-developed Images. Their constituents, in the main, seem to be the same as those of fully developed images, except that in the former they are faint and incipient.

(3.) Feeling of Direction. This made an incipient stage of object-images having particular localizations, *i. e.*, memory images and indicative images. Consequently a visual factor in its faint and incipient form seems to be a constant factor. In the case of some observers the feeling was sometimes experienced predominantly in kinesthetic terms.

For instance: *Duty before pleasure.* (Obs. *Sn.* III—ii—15.) "I expected a sentence. I read it in inner speech and had the familiarity-feeling for it and at about the same time, perhaps a little bit later, I had that sort of classification which I frequently have in such cases, and thought this is a moral maxim. Then I tried to get more special cases of some duty which I have. I tried to think, as an example of this, of something connected with my own affairs, but I did n't succeed very well. I had a very vague and indefinite idea of 'duty' and 'pleasure' and there was a kind of location here in the direction of my office. I did n't get any further idea about it, except the thought about something I had planned. But I think it may be this that I had some letters this morning which I wished to read, and was thinking that I would not be able to read them until after my lecture. There was only a tendency to run in that direction without any actualization of the circumstance."

Victory or Westminster Abbey. (Obs. *Cff.* I, A—14.) "Feeling of surprise because I expected something more, and also because of the peculiar construction of the sentence. The name Nelson came up almost at once, partly because his ship was called 'Victory' and partly because it suggested a saying such as he might have uttered. A vague almost visual image of the picture of Westminster Abbey and feeling of direction, *i. e.*, from the sea where the battle was fought to London as if my eyes were moving from one point to another—I felt inner movements of the eyes. Feeling of meaning was of a great warrior determined either to win or die. In this case there was n't much inner speech. The visual image took the place of the auditory though it was not very definite."

Sometimes the description of this feeling was too indefinite to surmise.

For instance: *Rhapsody.* (Obs. *Sn.* III—i—17.) "First my attention was good. I read the word in inner speech, and I had a suggestion of it in a musical sense, a certain piece of music called a rhapsody. I think there was a sort of direction toward Mechanics Hall where the concert was held. Two or three years, or it may be one year ago, I heard the Hungarian Rhapsody there. There was a sort of vague association with other concerts. Then I read the word again in inner speech and then I tried to get a meaning for it and that time a very faint, shadowy suggestion of a person in a state of rhapsody was seen. The direction of it was different from that to Mechanics Hall. It was very indefinite and faint and hardly can be called an image at all.

Heaven. (Obs. *Gl.* I—w—15.) First sound, next understanding. And third, a vague image of the sky or rather opening above. The mind went upwards. No visual image of the color.

(4.) Feeling of Content. The observers often described

this feeling as one of coming associations, incipient suggestions, etc., as already mentioned. This introspection is corroborated by the following considerations in regard to the relation of the feelings of richness and poorness of content to their concomitant conditions, *i. e.*, 1, to the material or kind of stimulus; 2, to the duration of the reaction; and 3, to the conditions under which the stimulus was given.

a. Material conditions. With absolutely difficult or unfamiliar stimuli when the observers had no definite suggestions or associations and their minds were "shut up" or "blank," no content feeling was present. Uninteresting or unfamiliar words usually awoke poorer content feeling than interesting or familiar ones did. Chinese characters (the ones to be compared in the identification experiments) awoke no proper content feeling. With a single definite and vivid general object-image (no matter whether it was visual, organic or kinesthetic), excepting memory images, the observers seldom experienced a rich content feeling, excepting in some cases of passive reaction where the observers exceptionally dwelt long on the suggested images.

b. Duration of reaction. Content feeling was not present in the reflexive type of reaction released by the pure feeling of familiarity or recognition alone. It was replaced or weakened on some occasions by a definite or vivid image occurring later in the development, which shows that proper time relations are essential for the appearance of this feeling.

c. Conditions under which the stimulus was given. Familiar words or phrases presented simultaneously in number and for a short interval awoke no content feeling.¹ Isolated words as a rule awoke richer content feeling than those given in phrases. A single noun awoke frequently a richer content feeling than did a short phrase.

These phenomena of the concomitances of the subjective and objective changes will be difficult to account for adequately in any other way than to assume a content feeling as a consciousness of the actual, simultaneous, and incipient excitation of a number of past experiences or images related to the stimulus. If a large number of such associations is actually excited, the result will be the feeling of richness of content. If the number is small, the result will be the feeling of poorness of content. If there is no association, the result will be the feeling of no content. The lack or poorness of content feeling in the case of sensory familiarity, "pure concept," and a number of simultaneously exposed words and phrases, is simply due to the insufficiency of necessary time

¹ This test was made in one of the auxiliary experiments.

for the actual reinstatement of past experiences, even in an incipient way. Familiar words or phrases have, of course, numerous potential associations, but to have a content feeling it is necessary to actualize some of them, at least. Too vivid or too definite single images work detrimentally to the feeling of rich content, because they absorb too much of the mental energy to awake at the same time numerous other incipient reproductions. Isolated words give richer feeling than phrases under the same circumstances, because there the associations are not circumscribed and the mind can welcome whatever related associations may revive, and the result is the crowding together of these associations in their incipient forms which is felt as richness of content. But this state of experience does not long endure, for one of the strongest of them, such as a recent memory association, will soon push itself up completely, as was often the case in our experiments. When a word is interwoven in a context, only such associations are tolerated by the mind as will conform to the general purport or meaning of the phrase, and all other incoherent associations are suppressed.¹ The richer feeling often attending a single word in comparison with a short phrase is perhaps due also to insufficiency in the time allotted to each word of the phrase for the development of its own content feeling, *i. e.*, the mind moves on too quickly to the next word. The rich content feeling of a memorial association, in spite sometimes of its comparative vividness and definiteness, is very likely due partly to the details and variety of the imagery and partly to emotional excitations. The following instances will illustrate this point.

Philosophy. (Obs. L. M. III, ii—2.) "Sense came very quickly; not with the reading of the word but immediately after; and it seemed to have a great deal of meaning, perhaps because of the fact that I had been reading philosophy last night. There was feeling of tension and excitement until I got the sense. The feeling was agreeable."

Sleep is necessary for health. (Obs. Ch. III—ii—9.) "... "The feeling of familiarity was pretty complete because it suggested my own condition, that is, I did not sleep last night very well. So there was a pleasure in it, and thus the feeling of familiarity had a rich content, for it refers to personal interest."

Sleep is necessary for health. (Obs. E. M.) "Perfect feeling of familiarity and certainty of judgment. It awoke a good deal of association with it, because I have made an effort without success to sleep after dinner this afternoon."

Regarding the ultimate analysis of this feeling which is the awareness of numerous simultaneously excited incipient

¹ Cf. Huey's result: "The words given in isolation gave a greater variety of association than did the context words." *Am. J. of Psychol.*, Vol. XII, p. 282 ff.

images, it is clear that this feeling has nothing to do with the tri-dimensional feelings which may, or may not accompany it by way of addition. Again, as it is the direct awareness of images themselves, it cannot be called a subjective affection or emotion, excepting in cases of emotional excitations in memorial association which give the meaning a "sense of reality" or "warmth." Emotions in these cases, however, only emphasize and do not make up the content itself, which is constituted of memorial associations. There is need always of incipient images for meaning, whether it is cool or warm, dry or rich. Whereas, emotions of various form can exist without understanding or sense of meaning.

Neither can we describe the content feeling in terms of a definite and specific image for it is, first, the resultant of many images or associations, each of which consists of more than one specific or sensory image (such as a visual, an auditory, a motor, etc.); and, secondly, these images are all only incipiently awakened. The pure feeling of richness or poorness of content, without any subjective trace of images, may be, in the meanwhile, called a "total feeling," not in the sense of the fusion of feelings proper, but in the sense of the fusion of faintly excited different images.

(5.) Pure Feeling of Concept or Meaning. Owing to the vagueness of the customary terms "concept" or "meaning" as regards their psychical constituents, the writer has no direct basis for analysis when the observers simply speak of a concept or meaning without further description. So that so long as there is given no positive description of this experience, the only way at hand is to infer it. The inference is made from the nature of other types of meaning which generally immediately precede or succeed the feeling of concept, or sometimes replace it. The type which precedes is the pure feeling of familiarity, or recognition of the stimulus as the one already familiar. The type which succeeds is the pure feeling of content. So that a pure feeling of concept, meaning or knowing, without any further configuration or content may be identified with the pure feeling of recognition or familiarity, or with something quite similar in nature. If the feeling of concept or meaning has something more substantial, it may be identified with the content feeling. If its nature becomes more materialized, so to speak, it will be found identical with the feeling of direction, or with half or fully developed images. But in such cases it is no more pure.

(6.) Pure Feeling of Familiarity or Recognition. This feeling, as already stated, was the first and quickest to appear of all types of meaning, and attached directly to the stimulus with-

out any intermediary except audito-motor reading when the stimulus was exposed. It thus makes the first or the most primitive stage of the series of reproductive processes. As a reproductive process, there seems to be no important differences between the experience (as such) of familiarity with the stimulus as one experienced before (whether understood or not) or "sensory recognition," and the familiarity with the stimulus as one understood before or known, or "conceptual recognition."¹

In the earlier stage of this feeling there was often no subjective difference between the "sensory familiarity," *i. e.*, the recognition of the stimulus as one experienced before (whether understood or not), and the "conceptual familiarity," *i. e.*, the recognition of the stimulus as one, the meaning of which is known to the observer. This fact is shown in the cases of premature or mistaken reaction, as mentioned before. Thus in their first stage of reproduction both sensory and conceptual familiarity must be very much alike or identical.² The subjective criterion by which the observers became soon after aware of their mistakes must very likely be the presence and absence of content feeling or "coming associations."

So much for the psychological nature of pure knowing as meaning; now regarding the ultimate constituents of sensory familiarity. Let us take the simplest case. Perhaps the simplest, purest and at the same time the most durable type of this feeling is that which was experienced by the observers in the recognition of the Chinese characters in the forms of purely visual nonsense stimuli practically free from associations. Though obviously this feeling is thoroughly originated by the previous impression of the same stimulus, the observers found it difficult to give any positive description of it in terms of psychical elements. By way of negative description, it may be noted that not only was there no one of our observers who ever positively identified this experience with tridimensional feeling but also there were many who reported it as decidedly different. That this feeling is not a mere alternation of the feelings of tension and relaxation is seen in the fact that observers often relaxed (thinking the characters too complex to identify and so giving up the attempt) without

¹The reader should not confuse this case of the reproduction of the feeling of knowing of once known (or easy) stimuli with the processes of knowing for the first time of unfamiliar stimuli.

²It must be remembered that we are dealing here with the reproduction of the feeling of knowing awakened by the perception of once known or understood, *i. e.*, familiar or easy stimuli, and not with the processes of knowing for the first time of unfamiliar or difficult stimuli which are quite complex.

having the experience of familiarity or recognition. Nor can it be regarded as a specific image, for it occurred earlier than any definite image. Even organic imagery or sensation which is more primitive and undifferentiated and consequently more all-embracing than kinesthetic imagery, will no more cover this feeling than do feelings of tension and relaxation. One will, perhaps, find this feeling in its bare form to be localized centrally rather than peripherally, as "spiritual" rather than corporeal. I may say, therefore, that this feeling is a fundamental, not further reducible, retrospective quality of a present impression, *i. e.*, a coloration or configuration given to the present impression by the rudimentary revival of its past experience. The present impression may be any existing content, sensation, feeling, image, idea, thought, etc. It is thus different from ordinary quality or intensity of sensations. It is not an independent element, as it attaches always to sensations or feelings and never occurs alone. The pure feeling of knowing awakened by familiar stimuli is only a special case of this feeling of familiarity; consequently "thought" in such a sense is neither a third element¹ nor a highly elevated something, but merely the most primitive and rudimentary form of reproduction. Thought in the sense of "transcendental" reference² which seems to have more content than pure recognition or knowing, may be found in our content feeling if its introspective aspect is indefinite, or in the feeling of direction or the indicative images if it is more definite. Bühler's "intention"³ in the sense of condensed thought or quick recapitulation may be found in our complex memorial associations as half-developed images. In short all varieties of meaning-experiences are found as belonging to one or other of the different stages of the revival of the related past experiences.

Social and practical custom attaches a certain cluster of associations to a word or phrase as its meaning to the exclusion of others, so that our understanding of a word or phrase, which is a direct or indirect,⁴ incipient or full recalling of such related associations, is, in all cases, a selective or purposive action from the logical or outer point of view. With easy or familiar words such selected associations are, however, ever ready and come promptly without any subjective or psychological experiences of the sort which usually characterize the selective processes, so that psychologically, or from

¹ Cf. Bühler: *Op. cit.*, p. 329.

² Messer: *Op. cit.*, 113.

³ *Op. cit.*, p. 346 ff.

⁴ That is, through the associations of intermediary images whose meanings are well known.

the inner point of view, a cluster of selected associations or meaning once mechanized becomes identical with a cluster of random associations, or pure reproductions. What is then the meaning in case of an unfamiliar or difficult word or phrase the comprehension of which is attended by a series of selective experiences, such as, feelings of effort, suspense, hesitation, searching, rejection, doubt, uncertainty, etc.? The answer is that a meaning, as a *resultant*, remains always the same whether it is reached through a strenuous or an easy process, whether it is consciously selected or mechanically reproduced. These selective experiences were not only common in all types of active or volitional thinking, whether it is understanding of abstract phrases or comparison of sense impressions, but are also found in their pure forms to be very much alike or identical. They were found to be stereotyped and did not develop to such successive series as did the reproductive tendencies, excepting that they showed changes in intensity and oppositions like those of feeling proper. Their apparent configurations and development must be, in reality, those of the content or reproductive series to which they attach. Clearness and unclearness of meaning, abstracted from content-feeling or reproduction, may be reduced to the mere feelings of certainty and uncertainty.

Further inquiry into the ultimate constituents of feelings of certainty and uncertainty and other selective experiences, which can be found in simpler and purer forms in the identification or comparison of purely sensory stimuli, is left for later studies.

SUMMARY OF THE PRINCIPAL RESULTS OF THE STUDY

1. Whether we have audito-motor or visual imagery of the stimulus word depends primarily upon whether the word is exposed or spoken.

2. The kinds of imagery, the frequency of which seemed markedly influenced by the individual peculiarities of the observers, were as follows: 1, Motor speech; 2, visual speech; 3, associated (suggested) word-images; 4, associated object-images in visual terms.

3. The frequency of memory images is primarily conditioned neither by the concreteness or abstractness of the stimulus word nor by individual peculiarities, but by the slowness or quickness of the reaction.

4. The customary method of association experiments seems to be too artificial for the study of natural or real associations. Whereas the *Ausfrage* method seems to be better adapted both to the study of the general laws of association and to the study of individual peculiarities of association.



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5. Whether or not one has in the understanding of a word or phrase a concrete representation depends primarily upon the duration, *i. e.*, upon the time one dwells upon it. .

6. The characteristic constituents of the meaning of a word or phrase are not selective experiences, but series of different phases of reproduction.

7. "Feeling of concept" may be reduced to either "feeling of familiarity" or "feeling of content." "Feeling of content," which is the awareness of the more or less fused aggregate of incipient associations, seems to be hardly reducible to any specific images. "Feeling of familiarity," which is the most fundamental and elementary form of the reproductive experience and seems to be reducible neither to the feelings proper nor to the so-called intensity-quality attributes of sensations, may be regarded for the present as a third or retrospective quality of sensations or other psychic experiences.¹

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